451-13

23 Aug 89

ANNEX D +6

REMEDIAL INVESTIGATIONS AND FEASIBILITY STUDIES
AT THE
INCINERATOR ASH LANDFILL
SENECA ARMY DEPOT, ROMULUS, NEW YORK

1.0 GENERAL STATEMENT OF SERVICES

1.1 Background. As part of its continuing program of evaluating its hazardous waste management practices, the Army is performing Remedial Investigations/Feasibility Studies (RI/FS) at Seneca Army Depot (SEAD). A recently completed site investigation of the abandoned ash landfill area (Solid Waste Management Unit (SWMU) Designations SEAD-3, SEAD-6, SEAD-14 and SEAD-15) has documented the existence of a narrow plume of groundwater contamination which is believed to extend to, and possibly beyond, the Depot's western boundary. The contaminants of concern are chlorinated volatile organic compounds (VOC's); trans-1,2-dichloroethene, trichloroethene and, to a lesser extent, 1,2-dichloroethene, vinyl chloride and chloroform. Additionally, some heavy metals were found at concentrations above background. The RI/FS investigations are to be conducted to determine the magnitude of environmental contamination and appropriate remedial actions. The US Army Corps of Engineers, Huntsville Division, on behalf of SEAD, is contracting for the required work.

1.2 Location. Seneca Army Depot is a US Army facility located in Seneca County, New York. SEAD occupies approximately 10,600 acres. It is bounded on the west by State Route 96A and on the east by State Route 96. The cities of Geneva and Rochester are located to the northwest (14 and 50 miles, respectively); Syracuse is 53 miles to the northeast and Ithaca is 31 miles to the south. The surrounding area is generally used for farming.

1.3 Regulatory Status. The Incinerator Ash landfill area of Seneca Army Depot was included on the Federal Facilities National Priorities List on 13

July 1989. Consequently, all work to be performed under this contract shall be performed according to CERCLA guidance as put forth in the Draft "Guidance for Conducting Remedial Investigations/Feasibility Studies under CERCLA", dated March 1988 (Reference 11.21).

1.4 Previous Investigations. Previous investigations have been performed at various SEAD units. An "Installation Assessment and Update" (USATHAMA Reports No. 157 (1980) and 157(U) (1987), respectively) were conducted by the U.S. Army Toxic and Hazardous Materials Agency. The purpose of the assessments was to identify potentially contaminated areas at the Depot. The U.S. Army Environmental Hygiene Agency's Groundwater Contamination Survey No. 38-26-0868-88, "Evaluation of Solid Waste Management Units, Seneca Army Depot" identifies and describes all solid waste management units (SWMU's) at SEAD. In addition, a confirmation study has been performed and closure plans are being developed for the burning pads (SEAD-23). USATHAMA also conducted a "Site Investigation Report" in March 1989 for the Burning Pit/Landfill. A complete list of previous investigations is presented as References in Section 11.0.

1.5 Units to be Investigated Under this Contract. The RI/FS investigations will be focused on the incinerator ash landfill area, which is comprised of the following designated SWMU's.

1.5.1 Incinerator Cooling Water Pond, SWMU No. SEAD-3

1.5.2 Incinerator Ash landfill, SWMU No. SEAD-6

1.5.3 Refuse Burning Pits SWMU No. SEAD-14

1.5.4 Abandoned Incinerator (Building 2207), SWMU No. SEAD-15

1.6 Security Requirements. Compliance with SEAD security requirements is mandated. These requirements are presented in Section 9.0.

2.0 OBJECTIVE

The objective of this Scope of Work is to perform a complete RI/FS at the incinerator ash landfill area as defined by Office of Solid Waste and Emergency Response Directive 9355, beginning with the RI/FS scoping process and ending with a signed Record of Decision, at the identified site.

3.0 DETAILED DESCRIPTION OF SERVICES

3.1 General Requirements. All work performed by the AE shall, so far as possible, be designed and implemented in a manner which complements earlier investigations and shall conform to this Statement of Work (SOW). The AE, through Work Plans and RI/FS Reports, shall present a complete description of the RI/FS process as applied to the facility. All work shall be performed under the general supervision of both a Professional Engineer registered in the State of New York and a Certified Professional Geologist.

3.2 RI/FS Work Plan Preparation. The AE shall prepare three documents; a RI/FS Project Scoping Document, a RI/FS Work Plan Document, and a Community Relations Plan Document which are intended to do the following: (1) to provide a consolidated report on site history, current site activities, and resulting environmental impacts; (2) to familiarize the AE's personnel who are working on the project with site conditions; and (3) to provide project plans and proposed tasks by which the AE's personnel shall conduct RI/FS activities. It is intended that only one set of documents, addressing all of the site components listed in paragraph 1.5, be prepared. Each of the components of the site shall be separately addressed within the set of documents. The initial site visit, geophysical surveys, and soil-gas investigations shall not be performed until an "abbreviated" SHERP, as discussed in Section 5.0, is reviewed and approved. No remaining field work may be performed until the formal plans are reviewed and approved by the Contracting Officer. All work must be performed according to the plans. The documents shall be prepared as follows:

3.2.1 (Task D-1) Site Visit and Review Existing Data. The AE shall perform a visual inspection of the site, review the records, reports and other data provided by the Contracting Officer and the facility, or made available to the AE from sources such as public records, the USEPA, the State Regulators, the State Geological Survey, or from interviews with local residents and officials who have knowledge of past site activities. Prior to commencement of the site visit, an "abbreviated" SHERP must be prepared and submitted in accordance with Section 5.0.

3.2.2 (Task D-2) RI/FS Project Scoping Document. This Task corresponds to a portion of EPA Task 1 in Appendix B of the RI/FS Guidance

Manual. The AE shall prepare and submit a RI/FS Project Scoping Document which provides a summary of site conditions, gives an overview of the RI/FS process and describes how the process will be implemented at Seneca Army Depot. The RI/FS Project Scoping Process shall contain, as a minimum, the following elements:

3.2.2.1 Physical Characteristics of the Site. The AE shall provide a site description which includes location, ownership, topography, geology, hydrology, land use, waste type, estimates of waste volume, synopsis of findings and results of previous investigations, and other pertinent details. The description shall also include historical events of concern such as chemical storage and disposal practices, results and findings of previous studies and a "quality assurance" evaluation of the existing data in order to estimate its reliability.

3.2.2.2 Conceptual Site Model. From the analysis of the data reviewed, the AE shall make a preliminary determination of the physical characteristics of the site and prepare a Conceptual Site Model of the known contaminants. The model is to give an overview of site conditions, probable and potential contaminants of concern, severity of contamination, and the potential impacts on the environment. As a minimum the Conceptual Site Model shall include potential routes of migration, potential receptors and anticipated impacts.

3.2.2.3 Develop and Evaluate Preliminary Remedial Action Objectives and Alternatives. The AE shall present an overview of the remedial actions that could be reasonably used to mitigate adverse site conditions. The choice of alternatives shall be based on proven effectiveness of the technology and the anticipated cost of implementation. This is not meant to be a detailed investigation of all potentially available remedial technology.

3.2.2.4 Preliminary Identification of ARAR's and TBC Requirements. The AE shall make a preliminary determination of potential contaminant, location, and action specific ARAR's based upon an evaluation of existing site data.

3.2.2.5 Develop Data Needs and Data Quality Objectives. The AE shall evaluate the existing data and determine the additional data necessary

to characterize the site, complete the conceptual site model, better define the ARAR's, and narrow the range of preliminary identified remedial alternatives. The AE shall consider the intended uses of existing data as well as data to be collected under this contract and determine the type, quantity, and quality of additional data needed for each site.

3.2.3 (Task D-3) Geophysical Investigations. The AE shall perform the Geophysical Investigations program during the RI/FS Work Plan preparation phase of the RI/FS. It is specifically intended that the geophysical explorations be performed during Work Plan preparation so that the data can be utilized to assist in preparing the Soil-Gas Investigation and the Field Sampling Plans which select and justify subsequent, more detailed site characterization activities.

3.2.3.1 (Subtask D-3.1) Geophysical Investigation Plan. The AE shall prepare and submit a brief work plan which describes specific equipment, methods and personnel which the AE proposes to utilize to accomplish the geophysical investigations. The plan shall propose specific locations for proposed geophysical investigations and shall include justification for the method selected for use at each site in order to meet the objective of the geophysical investigations which is to obtain information on the physical, subsurface conditions at source areas for the site.

3.2.3.2 (Subtask D-3.2) Geophysical Surveys. The AE shall perform Geophysical Surveying according to the requirements of the approved GIP. The AE shall perform a minimum of 10,000 linear feet of geophysical survey over 10 acres. The AE shall utilize a method of geophysical investigation capable of detecting buried 55-gallon drums and debris, if existing, to a depth of 15 feet. The purpose of the geophysical surveys is to obtain detailed information necessary for source characterization. The AE shall utilize sufficient location control in the field to ensure that geophysical anomalies located are recoverable to an accuracy of plus or minus one foot. The AE shall report the results of the geophysical investigations as a letter report submitted no later than the submission date of the draft RI/FS Work Plan. Prior to commencement of the geophysical surveys, an "abbreviated" SHERP must be prepared and submitted in accordance with Section 5.0.

3.2.4. (Task D-4) Soil-Gas Investigations. The AE shall perform the Soil-Gas Sampling and Analysis program during the RI/FS Work Plan preparation phase of this RI/FS. It is specifically intended that the soil-gas investigation be performed during Work Plan preparation so that the data can be utilized to assist in preparing the Field Sampling Plan which selects and justifies subsequent, more detailed site characterization activities.

3.2.4.1 (Subtask D-4.1) Soil-Gas Investigation Work Plan. The AE shall submit a brief work plan which proposes soil-gas sampling locations and which describes the sampling equipment, personnel, and procedures to be used. The plan shall recommend specific numbers of soil-gas samples to be collected at each site investigated and the target analytes for each site investigated. The work plan will also specify safety procedures to be utilized during the soil-gas sampling, using the AE's corporate Safety, Health and Emergency Response Plan, (SHERP). However, the detailed RI/FS SHERP will not be required with this submittal.

3.2.4.2 (Subtask D-4.2) Soil-Gas Sampling and Analysis. The AE shall perform soil-gas sampling and analyses at a minimum of 100 locations at the facility. The purpose of the soil-gas sampling program shall be to locate sources and migration routes of volatile petroleum hydrocarbons and/or volatile chemicals in the soil and groundwater. Samples collected shall be analyzed by GC/MS. The AE shall report the results of the Soil-Gas Sampling as a letter report submitted no later than the submission date of the draft RI/FS Work Plan. Prior to commencement of the soil-gas investigations, an "abbreviated" SHERP must be prepared and submitted in accordance with Section 5.0.

3.2.5 (Task D-5) RI/FS Work Plan. This Task corresponds to a portion of EPA Task 1 in Appendix B of the RI/FS Guidance Manual. The AE shall prepare an RI/FS Work Plan Document. Quality Control/Quality Assurance procedures, Standard Operating Procedures, methods, equipment, and specific personnel along with their qualifications that the AE proposes to utilize to accomplish the RI/FS shall be identified and discussed at appropriate locations within the plan. As a minimum the RI/FS Work Plan shall include the following:

3.2.5.1 (Subtask D-5.1)-Safety, Health and Emergency Response Plan (SHERP). The AE shall prepare and submit a Safety, Health and Emergency Response Plan (SHERP) that the AE's personnel, subcontractors and visitors to the site shall use while the field investigations are being conducted. This portion of the RI/FS Work Plan shall be prepared according to Section 5 of this SOW and the requirements of the SEAD Safety office.

3.2.5.2 (Subtask D-5.2) Quality Assurance Project Plan. The AE shall prepare and submit a Quality Assurance Project Plan (QAPP) according to the requirements of Section 6 of this SOW. This portion of the RI/FS Work Plan shall also describe in detail, the following: 1) Site Background; 2) Quality control and quality assurance procedures to be exercised including organization and responsibilities; 3) QA objectives; 4) Sampling procedures; 5) Sample custody; 6) Calibration procedures; 7) Analytical procedures; 8) Data reduction, validation and reporting; 9) Internal quality control; 10) Performance and system audits; 11) Preventive maintenance; 12) Data assessment procedures; 13) Corrective actions; and, 14) Quality assurance reports.

3.2.5.3 (Subtask D-5.3) Field Sampling Plan. The AE shall prepare and submit, as part of the RI/FS Work Plan, a Field Sampling Plan (FSP). The FSP shall describe in detail all sampling and analysis activities to be exercised including site background, sampling objectives, sampling locations and frequency, designations, equipment and procedures and handling and analysis requirements to be applied at each site. Section 3.3.1 of this SOW provides for numerous field investigation activities which will be applied to the project. It is intended that the AE, in the Field Sampling Plan, propose and justify how the field investigation activities will be allocated to specific RI/FS sites. In addition to the specific requirements of the RI/FS Guidance Document, the AE shall provide the following subplans as part of the FSP.

3.2.5.3.1 Soil Boring and Monitoring Well Installation Plan. The AE shall prepare and submit a Soil Boring and Monitoring Well Installation Plan according to the requirements of Section 7 of this SOW. This portion of the RI/FS Work Plan shall include proposals for locations of specific wells and borings based upon previous investigations, the AE's own evaluation of the sites, and the results of the Soil-Gas Investigation.

3.2.5.3.2 Test Pit Excavation Plan. The AE shall prepare and submit a Test Pit Excavation Plan proposing excavation and logging methods, decontamination procedures, and locations for test pit excavation into known and suspected waste disposal sites. A total of 20 pits will be required at the landfill area. The purpose of the test pits is to obtain information necessary for source characterization. Each pit shall be a minimum of 3 feet deep, to bedrock, or to ground-water, whichever is encountered first. Each pit shall be approximately four feet wide and ten feet long. Each pit shall be visually and photographically logged from the natural ground surface. No one shall ever actually enter any test pit. At each pit an average of two soil or waste samples shall be collected from the excavator bucket. Each pit shall be backfilled with the material excavated from it within 48 hours of the initial excavation. If an excavation is left unattended, the AE shall mark and barricade it to prevent accidental entry by personnel or livestock.

3.2.5.3.4 Air Monitoring Plan. The AE shall prepare and submit an Air Monitoring Plan which proposes and justifies air monitoring methods, equipment and personnel to be used during air monitoring. Air monitoring will be required at two sites to develop baseline conditions prior to test pit excavation and then again during test pit excavations to determine if significant release of contaminants to the air are occurring.

3.2.6 (Task D-6) Community Relations Plan. The AE shall prepare and submit a Community Relations Plan (CRP) according to the requirements of the RI/FS Guidance Manual, Appendix B, Task 2. It shall describe how and when the community will be informed of RI/FS activities and findings. The Plans shall describe how the RI/FS is to be implemented and managed, describe the information expected from each task and how the information will be gathered, interpreted and incorporated into the RI/FS Reports. The Plan will describe the full RI/FS process, through implementation of Remedial Action, (even though this SOW does not carry the RI/FS process to that point) so that the entire process is described. It is intended that the plan and descriptions use non-technical jargon wherever possible in preparing the Community Relations Plan.

3.3 Phase I Remedial Investigation/Feasibility Studies. The objective of Phase I of this SOW is to perform the RI/FS activities corresponding to USEPA's Phase I Remedial Investigation and USEPA Phase I and USEPA Phase II Feasibility Studies. The AE shall perform the RI and FS activities approximately concurrently, and submit the data in combined RI/FS reports. When all the field work and data analyses are complete, the AE shall prepare a Phase I RI/FS Report. The AE shall also present specific recommendations for Phase II Remedial Investigations and Feasibility Studies that may be necessary to complete the RI/FS.

3.3.1 Phase I Remedial Investigations.

3.3.1.1 (Task D-7) Field Investigations. The work required in this Section corresponds to EPA Task 3 in Appendix B of the RI/FS Guidance Manual. The AE shall perform field investigations in order to characterize the site and determine the nature and extent of soil and groundwater contamination. The work shall be performed according to the approved work plan and as follows:

3.3.1.1.1 (Subtask D-7.1) Install Soil Borings. The AE shall install 10 soil borings at locations determined in the approved FSP. The average depth of the borings shall be 15 feet deep, but individual borings may be shallower or deeper. A total of 150 linear feet of drilling is provided for under this subtask. Ten soil samples will be collected as part of this subtask for subsequent chemical analysis under Subtask D-7.1.

3.3.1.1.2 (Subtask D-7.2) Install Shallow Wells. The AE shall install 10 shallow groundwater monitoring wells at locations determined in the approved FSP. The maximum depth of the wells shall be 20 feet deep, but individual wells may be shallower or deeper. A total of 200 linear feet of drilling is provided for under this subtask.

3.3.1.1.3 (Subtask D-7.3) Test Pit Excavations. The AE shall excavate 20 test pits at locations determined in the approved FSP. Forty soil samples will be collected as part of this task for subsequent chemical analyses under subtask D-8.1.

3.3.1.1.4 (Subtask D-7.4) Surface Water Sampling. The AE shall collect one round of surface water samples at locations determined in the approved FSP. Ten field samples shall be collected at ten locations for analysis under subtask D-8.2.

3.3.1.1.5 (Subtask D-7.5) Air Monitoring. The AE shall conduct Air Monitoring at locations determined in the approved FSP. The purpose of the air monitoring is to obtained detailed information necessary for the Baseline Risk Assessment.

3.3.1.1.6 (Subtask D-7.6) Surveying. Each new soil boring, monitoring well, test pit and surface water sampling point shall be located according to the requirements of Section 8.0 of this Statement of Work.

3.3.1.2 (Task D-8) Chemical Sampling and Analysis. The work required in this Section corresponds to EPA Tasks 4 and 5 in Appendix B of the RI/FS Guidance Manual. The AE shall collect and analyze samples in a manner determined in the approved FSP. The total number of samples to be collected by the AE along with required and approved analysis methods are shown in Tables 1 and 3 The AE shall prepare cost estimates assuming that the entire Table 1 list will be analyzed. During contract negotiations the AE and Contracting Officer will agree on a unit price for each method. If all analyses specified in this SOW are not required, the price shall be reduced according to the agreed unit price. The AE shall submit a Table which provides the results of each round of analytical data as soon as it is received from the laboratory, and not wait for the next scheduled report submission.

3.3.1.2.1 (Subtask D-8.1) Analysis of Soil Samples. The AE shall analyze 50 soil samples previously collected from the 10 soil borings and the 20 test pits. The total number of soil and QA/QC samples and analysis are summarized in Table 2-17. The AE shall submit a Table which provide s the results of each round of analytical data as soon as it is received from the laboratory, and not wait for the next scheduled report submission.

3.3.1.2.2 (Subtask D-8.2) Collection and Analysis of Groundwater Samples. The AE shall collect and chemically analyze one groundwater sample from each of the 10 new groundwater monitoring wells installed and each of 10 existing wells. A total of 20 wells will be sampled

under this subtask. In addition, the AE shall chemically analyze the ten surface water samples collected in Subtask D-7.4. The total number of water and QA+/QC samples to be taken and the required analyses are summarized in Table 2-18. The AE shall submit a Table which provides the results of each round of analytical data as soon as it is received from the laboratory, and not wait for the next scheduled report submission.

3.3.1.3 (Task D-9) Baseline Risk Assessment. The work required in this Section corresponds to EPA Task 6 in Appendix B of the RI/FS Guidance Manual. Using the information gathered from the record search, the field work and data analyses, the AE shall prepare and submit a quantitative Risk Assessment. The Risk Assessment shall provide an evaluation of the potential threat to human health, the environment, and ecology in the absence of any remedial action and provide the basis for determining whether or not remedial action is necessary. The Risk Assessment Report shall be prepared using the guidance presented in the RI/FS Guidance Manual and, as a minimum, contain a baseline risk assessment, an exposure assessment, and a standards analysis. The Risk Assessment shall be submitted with the Phase I RI/S Report. The AE shall provide information including, but not necessarily limited to, the following:

3.3.1.3.1 (Subtask D-9.1) Identification of Contaminants of Concern. Using the information gathered from field work, record search, and consultation with appropriate local, State and Federal Officials the AE shall identify the contaminants which are of concern. The AE shall provide a summary of each identified contaminant describing why it was selected, and the effects of its chronic and acute toxicity to humans and the environment.

3.3.1.3.2 (Subtask D-9.2) Exposure Assessment. The AE, using modeling, shall identify actual or potential exposure paths and routes, characterize potentially exposed populations, and estimate expected exposure levels. As part of the Exposure Assessment, the following Task shall also be performed:

3.3.1.3.2.1 (Subtask D-9.2.1) Water Well Survey. The AE shall make a reasonable effort to determine the existence of all operating water wells used for human consumption within one mile of the Installation that may be affected by deteriorated water quality on the Installation. A

"house-to-house" survey is not intended. However, whenever possible, the AE shall include well location, depth, screened interval, water use, and number of people served by the well. This task may be performed through the examination of records available at public sources, backed by occasional field checks. The information shall be provided both in tabular form and on suitable maps.

3.3.1.3.2.2 (Subtask D-9.2.2) Spring Survey. The AE shall make a reasonable effort to determine the existence of all springs used for human consumption within one mile of the Installation that may be affected by deteriorated water quality on the Installation. The information shall be provided both in tabular form and on suitable maps.

3.3.1.3.3 (Subtask D-9.3) Toxicity Assessment. The AE shall make a comparison of acceptable levels of contamination with actual levels identified during the exposure assessment. The comparison shall be based upon available ARARs, TBCs and other toxicological data, where existing.

3.3.1.3.4 (Subtask D-9.4) Risk Characterization. The AE shall, based upon other components of the Risk Assessment, characterize the risk associated with the site. The AE shall consider the carcinogenic risk, noncarcinogenic risk and the environmental risk. The characterization shall include a summary of each projected exposure route for contaminants of concern and the distribution of risk across various sectors of the population. Such factors as weight-of evidence associated with toxicity information, the estimated uncertainty of the component parts, and the assumptions contained within the estimates shall be discussed.

3.3.1.3.5 (Subtask D-9.5) Propose Applicable or Relevant and Appropriate Requirements (ARAR's) and To Be Considered (TBC) Requirements. The AE shall develop and propose contaminant and location specific "Applicable or Relevant and Appropriate Requirements" (ARAR's) and To Be Considered (TBC) Requirements which, after review and possible modification as directed by the Contracting Officer, will be utilized to evaluate subsequent proposed remedial actions. ARAR's and TBC's shall be prepared using guidance presented in the RI/FS Guidance Manual.

3.3.1.4 (Task D-10) Treatability Study Requirements Assessment. The work required in this Section corresponds to EPA Task 7 in Appendix B of the RI/FS Guidance Manual. The AE shall assess existing data on technologies identified as Remedial Action Alternatives to determine data needs required to undertake treatability investigations following completion of alternatives development. The AE shall recommend if specific Treatability Studies are required or if the existing situation is well enough understood and described in scientific, engineering and other technical literature such that site specific treatability studies do not appear to be necessary. The AE shall develop a Conceptual Treatability Study Plan. Actual implementation of the Treatability Study Plan is not part of this SOW. The Treatability Study shall be submitted with the Phase I RI/S Report.

3.3.2 (Task D-11) Phase I Feasibility Study. The work required in this Section corresponds to EPA Task 9 in Appendix B of the RI/FS Guidance Manual. The primary objective of this phase of the FS is to develop an appropriate range of waste management options that protect human health and the environment.

3.3.2.1 (Subtask D-11.1) Develop Remedial Action Objectives. The AE shall develop remedial action objectives which protect human health and the environment and then describe general response action which will satisfy the remedial action objectives.

3.3.2.2 (Subtask D-11.2) Identify and Evaluate Alternative Remedial Actions. The AE shall describe all available technologies that could be reasonably used as remedial actions at SEAD. The AE shall then screen the list to remove any potential Remedial Actions which are clearly illogical, inadequate, unfeasible, or otherwise ill-suited to the site. Remedial actions presented past the initial screening shall consist of only those representing proven technologies adequate to address site conditions. A detailed evaluation including the strengths and weaknesses of each technology shall be performed. The initial screening shall be based upon effectiveness, implementability and cost. Where appropriate, the AE may combine feasible remedial actions. The "no action" alternative shall be described in detail as part of this task. Additional data needed shall also be described.

3.3.3 (Task D-12) Prepare Phase I RI/FS Report. The work required in this Section corresponds to EPA Tasks 8 and 11 in Appendix B of the RI/FS Guidance Manual. At the completion of the preceding tasks, the AE shall prepare the Remedial Investigation/ Feasibility Study Report, fully documenting all Phase I work performed. The report shall be prepared according to the requirements of this SOW and the referenced guidance documents. The report shall also describe the recommended work to be performed during the Phase II RI/FS and make specific recommendations, and provide the justification, for sampling locations and analytes proposed for Phase II. As part of this report the AE shall evaluate the need for interim or expedited remedial actions at each of the sites. If the AE recommends that either is appropriate, he shall so propose and justify. The AE shall also propose and justify additional investigations to be undertaken as part of the Phase II Remedial Investigations, if any, for the Contracting Officer's review and approval.

3.4 (Task D-13) Record of Decision. The work required in this Section corresponds to EPA Task 12 in Appendix B of the RI/FS Guidance Manual. The AE shall prepare and submit a document for the signature of the SEAD Commander addressing the decision to implement the approved remedial action alternative.

4.0 SUBMITTALS AND PRESENTATIONS

4.1 Format and Content. The Engineering Reports, consisting of work plans and RI/FS reports, presenting all data, analysis, and recommendations shall be prepared in accordance with the suggested RI/FS Format as presented in the RI/FS Guidance Manual. Each submittal shall be accompanied by an EPA completeness checklist (where existing), completed by the AE, which references the specific location within the submitted report, of the required item. All drawings shall be of engineering quality in drafted form with sufficient detail to show interrelations of major features on the installation site map. When drawings are required, data may be combined to reduce the number of drawings. The report shall consist of 8-1/2" x 11" pages with drawings folded, if necessary, to this size. A decimal paragraphing system shall be used, with each section and paragraph of the reports having a unique decimal designation. The report covers shall consist of vinyl 3-ring binders and shall hold pages

firmly while allowing easy removal, addition, or replacement of pages. A report title page shall identify the AE, the Corps of Engineers, Huntsville Division, and the date. The AE identification shall not dominate the title page. Each page of draft and draft-final reports shall be stamped "DRAFT" and "DRAFT-FINAL" respectively. Each report shall identify the members and title of the AE's staff which had significant, specific input into the report's preparation or review. Submittals shall include incorporation of all previous review comments accepted by the AE as well as a section describing the disposition of each comment. Disposition of comments submitted with the final report shall be separate from the report document. All final submittals shall be sealed by both the registered Professional Engineer-In-Charge and the Certified Professional Geologist.

4.2 Presentations. The AE shall make presentations of work performed according to the schedule in paragraph 4.6. The presentation will consist of a summary of the work accomplished and anticipated followed by an open discussion among those present. The AE shall provide a minimum of two persons at the meetings which are expected to last one day each.

4.3 Conference Notes. The AE will be responsible for taking notes and preparing the reports of all conferences, presentations, and review meetings. Conference notes will be prepared in typed form and the original furnished to the Contracting Officer (within five (5) working days after date of conference) for concurrence and distribution to all attendees. This report shall include the following items as a minimum:

a. The date and place the conference was held with a list of attendees. The roster of attendees shall include name, organization, and telephone number.

b. Written comments presented by attendees shall be attached to each report with the conference action noted. Conference action as determined by the Government's Project Manager shall be "A" for an approved comment, "D" for a disapproved comment, "W" for a comment that has been withdrawn, and "E" for a comment that has an exception noted.

c. Comments made during the conference and decisions affecting criteria changes, must be recorded in the basic conference notes. Any augmentation of written comments should be documented by the conference notes.

4.4 Confirmation Notices. The AE will be required to provide a record of all discussions, verbal directions, telephone conversations, etc., participated in by the AE and/or representatives on matters relative to this contract and the work. These records, entitled "Confirmation Notices", will be numbered sequentially and shall fully identify participating personnel, subject discussed, and any conclusions reached. The AE shall forward to the Contracting Officer as soon as possible (not more than five (5) work days), a reproducible copy of said confirmation notices. Distribution of said confirmation notices will be made by the Government.

4.5 Progress Reports and Charts. The AE shall submit progress reports to the Contracting Officer with each request for payment. The progress reports shall indicate work performed, and problems incurred during the payment period. Upon award of this delivery order, the AE shall, within 15 days, prepare a progress chart to show the proposed schedule for completion of the project. The progress chart shall be prepared in reproducible form and submitted to the Contracting Officer for approval. The actual progress shall be updated and submitted by the 15th of each month and may be included with the request for payment.

4.6 Schedule of Deliverables and Review Meetings.

Deliverable/Meeting	Date
Draft Abbreviated SHERP	3 Oct 89
Final Abbreviated SHERP	17 Oct 89
Geophysical Investigation Work Plan	17 Oct 89
Geophysical Investigation Letter Report	9 Nov 89
Soil-Gas Investigation Work Plan	9 Nov 89
Gov't Comments Provided	16 Nov 89
Soil-Gas Investigation Letter Report	5 Dec 89
Draft RI/FS Scoping Document, Work Plan, and Community Relations Plan	19 Dec 89

Review Meeting at Seneca AD	9 Jan 90
Draft-Final RI/FS Scoping Document, Work Plan, and Community Relations Plan	26 Jan 90
Gov't Comments Provided	23 Feb 90
Final RI/FS Scoping Document, Work Plan, and Community Relations Plan	13 Mar 90
Draft Phase I RI/FS Report	3 Jul 90
Review Meeting at Seneca AD	17 Jul 90
Draft-Final Phase I RI/FS Report	7 Aug 90
Gov't Comments Provided	6 Sep 90
Final Phase I RI/FS Report	2 Oct 90
Draft ROD	16 Oct 90
Review Meeting at Seneca AD	30 Oct 90
Draft-Final ROD	20 Nov 90
Final ROD	4 Dec 90

The overall completion date for this delivery order shall be 4 Jan 1991.

4.7 Submittals.

4.7.1 General Submittal Requirements.

4.7.1.1 Distribution. The AE is responsible for reproduction and distribution of all documents. The AE shall furnish copies of submittals to each addressee listed in paragraph 4.7.3 in the quantities listed in the document submittal list. Submittals are due at each of the addressees not later than the close of business on the dates shown in paragraph 4.6.

4.7.1.2 Partial Submittals. Partial submittals will not be accepted unless prior approval is given.

4.7.1.3 Cover Letters. A cover letter shall accompany each document and indicate the project, project phase, the date comments are due, to whom comments are submitted, the date and location of the review conference, etc., as appropriate. (Note that, depending on the recipient, not all letters will contain the same information.) The contents of the cover letters should be coordinated with CEHND-ED-PM prior to the submittal date. The cover letter shall not be bound into the document.

4.7.1.4 Supporting Data and Calculations. The tabulation of criteria, data, circulations, and etc., which are performed but not included in detail in the report shall be assembled as appendices. Criteria information provided by CEHND need not be reiterated, although it should be referenced as appropriate. Persons performing and checking calculations are required to place their full names on the first sheet of all supporting calculations, and etc., and initial the following sheets. These may not be the same individual. Each sheet should be dated. A copy of this scope of work shall be included as appendix A in the Draft RI/FS report only.

4.7.1.5 Reproducibles. One camera-ready, unbound copy of each submittal shall be provided to the Contracting Officer in addition to the submittals required in the document and submittal list. All final submittals shall also be provided on floppy disks compatible with the Intel 310/80286 computer in ASCII format and in Word Star 2000 release 2.0 format.

4.7.2 Specific Submittal Requirements.

a. Abbreviated SHERP (Draft, Final) (Tasks D-1, D-3.2, D-4.2).
b. Geophysical Investigation Work Plan (Final) (Subtask D-3.1).
c. Geophysical Investigation Report (Final) (Subtask D-3.2).
d. Soil-Gas Investigation Work Plan (Final) (Subtask D-4.1).
e. Soil-Gas Investigation Report (Final) (Subtask D-4.2).
f. RI/FS Work Plan (Draft, Draft-Final, Final) (Tasks D-2, D-5, D-6)
g. RI/FS Report (Draft, Draft-Final, Final) (Task D-12).
h. Record of Decision (Draft, Draft-Final, Final) (Task D-13).

4.7.3 Addressees.

Commander
U.S. Army Corps of Engineers
Huntsville Division
ATTN: CEHND-ED-PM (Mr. Walt Perro)
PO Box 1600
Huntsville, AL 35807-4301

Commander
U.S. Army Depot Systems
Command (DESCOM)
ATTN: AMSDS-EN-FD
(Mr. Tim Toplisek)
Chambersburg, PA 17201

Commander
U.S. Army Environmental
Hygiene Agency (USAEHA)
ATTN: HSHB-ME-S
Building 1677
Aberdeen Proving Ground, MD 21010-5422

Commander
U.S. Army Material Command (USAMC)
ATTN: AMCEN-A (Mr. Bob King)
5001 Eisenhower Ave.
Alexandria, VA 22333-0001

Commander
U.S. Army Corps of Engineers
Toxic and Hazardous Materials Agency
ATTN: CETHA-IR-D (Ms. Katherine Gibson)
Aberdeen Proving Ground, MD 21010-5401

Commander
U.S. Army Corps of Engineers,
North Atlantic Division,
ATTN: CENAD-CO-EP
90 Church Street
New York, NY 10007-9998

Commander
U.S. Army Corps of Engineers
Missouri River Division
ATTN: CEMRD-ED-EA (Mr. Doug Plack)
PO Box 103, Downtown Station
Omaha, NE 68101-0103

Commander
U.S. Army Corps of Engineers
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Commander
Seneca Army Depot
ATTN: SDSSE-HE (Randy Battaglia)
Romulus NY 14541

Commander
HQUSACE
ATTN: CEMP-RI
20 Massachusettes Ave., NW
Room 2209
Washington, D.C. 20314-1000

4.6.4 Document and Submittal List.

	Abbrev. Draft	SHERP Final	Geophys. Wk. Plans	Geophys. Reports	Soil-Gas Wk. Plns	Soil-Gas Reports
CEHND-ED-PM	6	6	6	6	6	6
USAMC	0	0	1	1	1	1
DESCOM	0	0	2	2	2	2
CETHA-IR-D	2	2	2	2	2	2
CEMRD-ED-EA	3	3	3	3	3	3
CEMRD-EA-GL	0	0	1	1	1	1
SDSSE-HE	10	10	10	10	10	10
CENAD-CO-EP	0	0	0	0	0	0
USAEHA	0	0	0	0	0	0
CEMP-RI	0	0	0	0	0	0
TOTAL	21	21	25	25	25	25

	RI/FS Work Plans			RI/FS Report		
	Draft	Draft-Final	Final	Draft	Draft-Final	Final
CEHND-ED-PM	6	6	6	6	6	6
USAMC	1	1	1	1	1	1
DESCOM	2	2	2	2	2	2
CETHA-IR-D	2	2	2	2	2	2
CEMRD-ED-EA	3	3	3	3	3	3
CEMRD-EA-GL	1	1	1	1	1	1
SDSSE-HE	10	10	10	10	10	10
CENAD-CO-EP	1	1	1	1	1	1
USAEHA	1	1	1	7	7	7
CEMP-RI	0	0	0	1	0	1
TOTAL	27	27	27	34	33	34

	Record of Decision		
	Draft	Draft-Final	Final
CEHND-ED-PM	6	6	6
USAMC	1	1	1
DESCOM	2	2	2
CETHA-IR-D	2	2	2
CEMRD-ED-EA	3	3	3
CEMRD-EA-GL	1	1	1
SDSSE-HE	10	10	10
CENAD-CO-EP	1	1	1
USAEHA	0	0	0
CEMP-RI	1	0	1
TOTAL	27	26	27

5.0 SAFETY REQUIREMENTS.

Site activities in conjunction with this project may pose unique safety, chemical, and/or biological exposure hazards which require specialized expertise to effectively address and eliminate. The AE shall prepare and submit a Safety, Health and Emergency Response Plan (SHERP) to the Contracting Officer (CO) which shall address accident prevention, personal protection against chemical exposures, and emergency response procedures. The SHERP shall establish in detail the protocols necessary for protecting workers and on-site personnel, the public, and the environment from any hazards associated with well installation, soil borings, water sampling, and sediment sampling equipment and procedures; and from hazards associated with potential exposures from chemicals, agents, or situations suspected or known to be on the site. A Draft SHERP shall be submitted as a separately bound document to the CO for approval prior to the commencement of any on-site activity which, with revisions, will stand as the Final SHERP for this site. For initial site entry activities, geophysical surveys, and soil-gas investigation, an "abbreviated" SHERP shall be prepared and approved. This "abbreviated" SHERP need not be as detailed as the Final SHERP covering all other field activities. However, as a minimum, the "abbreviated" SHERP shall address tasks to be performed, the potential hazards (if any) resulting from those activities, and the measures to be implemented (personal protective equipment, monitoring, etc.) to protect personnel while on-site. Remaining field work shall not be performed until the Final SHERP has been reviewed and approved by the CO. All work shall be performed according to the approved SHERPs. The SHERPs shall be prepared in accordance with the requirements specified in this section. The SHERPs must be prepared and administered by a Certified Industrial Hygienist (CIH). Qualifications for the CIH shall consist of training and experience commensurate with the hazards to be encountered for the project. The SHERP shall comply with all federal, state, and local health and safety requirements, e.g., the Occupational safety and Health Administration (OSHA) requirements (29 CFR 1910 and 1926), the U.S. Environmental Protection Agency (USEPA) hazardous waste requirements (40 CFR 260-270), the U.S. Army Corps of Engineers

Safety and Health Requirements Manual (EM 385-1-1), and the U.S. Army Materiel Command Safety Manual, AMC-R 385-100. The SHERPs shall include but not limited to:

5.1 Organization/Administration. The AE shall assign responsibilities for safety activities and procedures. A Certified Safety Professional (CSP) shall be designated to implement the SHERPs for all onsite activities. A person certified in first aid/CPR by the Red Cross or equivalent, shall be continuously present on-site during operations.

5.2 Standard Operating Procedures (SOPs). The AE shall outline standard operating procedures (SOPs) for preventing accidents, and protecting personnel from injury and occupational illness for all operations having a significant accident potential. Approved SOPs will be made available to prime and subcontractor personnel for personnel information guidance and compliance.

5.3 Identification of Hazards. The AE shall review existing records and data to identify potential hazards associated with the designated drilling and sampling sites and to evaluate their impact on field operations. The AE shall develop action levels for controlling worker exposure to the identified hazards in accordance with appropriate requirements.

5.4 Personal Protective Equipment. The AE shall provide appropriate personal protective equipment (PPE) to ensure workers, official visitors and government employees are protected from exposure to recognized physical hazards and protected from exposure to hazardous chemical concentrations above the action level (Levels A, B, C, D, and modifications) for each operation stated for each work zone. The level of protection shall be specified in the SOP for each operation. The AE shall provide and maintain all PPE.

5.5 Safety and Health Training. The AE shall, as a minimum provide training to his employees complying with the requirements of 29 CFR 1910.120. The program shall inform employees, official visitors and government employees of the special hazards and procedures (including PPE, its use and inspection) to control these hazards during field operations. Employees shall be trained in emergency procedures, areas of restricted access, methods of decontamination, and general safety. All prime and subcontractor personnel shall complete this

program prior to beginning on-site work. The AE shall keep individual training records on all workers associated with the project and submit a copy of these records in the draft SOP.

5.6 Monitoring. The AE shall provide continuous monitoring of the identified hazards associated with the designated drilling sites for controlling worker exposure during field operation. When applicable, National Institute for Occupational Safety and Health (NIOSH) approved sampling and analytical methods must be used.

5.7 Emergency Procedures. The AE shall establish procedures to take emergency action in the event of immediate hazards, i.e.,a chemical agent leak or spill, fire, or personal injury. The AE designated CSP shall serve as the emergency coordinator. Personnel and facilities providing support in emergency procedures shall be identified. Specify the emergency equipment to be present on-site and the Emergency Response Plan procedures, as required by 29 CFR 1910.120 (1) (1) (ii).

5.8 Medical Surveillance. Prime and subcontractor personnel shall have medical examinations prior to commencement of work. The medical examination results shall be evaluated by a board-certified or board-eligible licensed physician practicing occupational medicine to determine if the individual is physically fit for the work to be performed and that no physical condition or disease would be aggravated by exposure to the identified hazards. Medical records shall be available for review by the CO upon request. Specify exam content and frequency.

5.9 First Aid. The AE shall provide appropriate emergency first aid equipment suitable for treatment of exposure to identified hazards, including chemical agents. A vehicle shall be made available to transport injured workers to medical facilities identified in the SHERP.

5.10 Accident Prevention, Recording and Recordkeeping. An accident prevention plan and description of work phase safety plans shall be addressed, as discussed in Paragraphs 01.A.03 thru 01.A.06 and Appendix Y of COE EM 385-1-1 for those topics not specifically addressed by this listing. The AE shall immediately notify the CO of any accident/incident. Within two working days

of any reportable accident the AE shall complete and submit to the CO an Accident Report on ENG Form 3394 in accordance with AR 385-40 and OCE supplement 1 to that regulation.

5.11 Safety Inspection. The AE shall conduct regular safety inspections to determine if operations are being conducted in accordance with established SOPs.

5.12 Site Layout and Control. Include a site map, work zone delineation, on/off-site communications, site access controls, and security (physical and procedural). The AE will determine three areas; exclusion, contamination reduction and support, for each work site. No person shall be allowed entry into the exclusion and contamination reduction areas unless in compliance with Sections 5.4, 5.5, and 5.8.

5.13 Air Monitoring Program. Specify the types and frequency of air monitoring/sampling to be performed. Include real-time (direct-reading) monitoring and integrated (TWA) sampling for specific contaminants of concer, as appropriate. Discuss instrumentation and calibration to be performed.

5.14 Health and Safety Work Precautions. Buddy system, eating and drinking precautions, smoking and ignition sources, potentially hazardous noise, explosive atmosphere, illumination, heat or cold stress, confined space entry precautions, eye wash stations, fire extinguishers, sanitation, and routine safety inspections shall be discussed.

5.15 Personnel and Equipment Decontamination. Specify decon facilities and procedures for personnel protective equipment, sampling equipment, and heavy equipment.

5.16 Logs, Reports, and Recordkeeping. Safety inspection reports, accident/incident reports, medical certifications, training logs, monitoring results, etc. All exposure and medical monitoring records to be maintained according to OSHA standard 29 CFR 1910.20.

5.17 Unexploded Ordnance. The facility is a military installation and has been used for storage, evaluation and disposal of ordnance and/or explosive materials as well as for military training. If explosive contamination or unexploded ordnance is discovered at any time during operations at the site the AE shall mark the location, immediately stop operations in the af-

fected area, and notify the CO. The Government will make appropriate arrangements for evaluation and proper disposal of the device. It is anticipated that in the unlikely event that such conditions arise, they will be overcome with only slight delays to the AE. It is the express intention of the Government that the AE is not to drill, excavate, or otherwise disturb the subsurface in areas where ordnance or explosives may reasonably be suspected unless specific, detailed plans to do so are prepared and approved.

5.18 Suggested SHERP Format.

STAFF ORGANIZATION

Principal Engineer
Program Manager
Certified Industrial Hygienist
Certified Safety Professional
First Aid/CPR Personnel
Field Personnel
Subcontractor Personnel

HAZARD COMMUNICATION AND TRAINING

Comprehensive Health and Safety Indoctrination
Specialized Training
Visitor Training
Pre-Investigation Health and Safety Briefing
Post-Investigation Health and Safety Briefing
Morning Safety Meetings

MEDICAL SURVEILLANCE

Medical Surveillance
Licensed Occupational Physician
Medical Examinations

EXPOSURE MONITORING

- Environmental and Personnel Monitoring
- Meteorological Monitoring
- Sampling and Analytical Methods
- Heat/Cold Stress Monitoring

HEALTH AND SAFETY EQUIPMENT

- Personal Protective Equipment
- Environmental Monitoring Equipment
- Decontamination Equipment
- Emergency Equipment
- Emergency-Use Respirators
- Spill Control Equipment
- Fire Extinguishers
- First Aid Equipment and Supplies
- Emergency Eye Wash/Shower (ANSI Z358.1)
- Personnel Hygiene
- Personnel Decontamination
- Communications

STANDARD OPERATING PROCEDURES

- Health and Safety Site Plan
- Site Description
- Site Inspection
- Site Security
- Site Entry Procedures
- Responsibilities
- Work Zones
- Hazard Evaluation
- Activity Hazard Analysis
- Accident Prevention
- Accident Reporting
- Safe Work Practices

Confined Space Entry Procedures
Material Handling Procedures
Levels of Protection
Decontamination Procedures
Emergency Information
Emergency Response Plan
Illumination
Sanitation
Well Installation/Logging
Sampling
Land Survey
Laboratory Analysis
Logs, Reports, and Recordkeeping

6.0 QUALITY ASSURANCE PROJECT PLAN REQUIREMENTS

The AE shall prepare and submit the Quality Assurance Project Plan (QAPP) according to the requirements of this section, ER 1110-1-263, and the definitions given in Paragraph 6.9. The site specific field and laboratory QC/QA plan shall be included. The AE shall propose only methods and procedures in the work plans acceptable to EPA and the State of New York.

6.1 Approval. The work plan must be approved by the CO prior to performing any field work. In the event corrections or comments are made by the CO on the draft plan, any necessary changes shall be implemented by the AE before final approval.

6.2 AE Responsibility for Chemical Analyses. It is the responsibility of the AE to properly collect, transport, analyze and present the data pertaining to chemical analysis. If the AE or his subcontractor does not follow the specified criteria and approved work plans and thereby jeopardizes the samples, the Contracting Officer will disapprove the samples and direct the AE to resample, analyze, and present the data at no additional cost to the Government. If directed to do so by the Contracting Officer, the AE shall collect and send representative "split" samples to the US Army Corps of Engineers, Missouri River Division Laboratory (CEMRD-ED-GC, 402-221-7324). The

AE will not be responsible for the analysis of the "split" samples or subsequent reporting results. The AE, however, is required to defend his results if there is disagreement between the samples analyzed by the AE and the samples analyzed by the CEMRD laboratory.

6.3 Content and Format. The plan shall address each of the topics in Paragraphs 6.4 through 6.8.5. The following outline shall be used as applicable.

SECTION 1.0 PROJECT ORGANIZATION AND RESPONSIBILITY
SECTION 2.0 SAMPLING
2.1 Selection of Sampling Locations
2.2 Samples to be Collected
2.1.1 Soil/Sediment Samples
2.1.2 Groundwater Samples
2.1.3 Soil-Gas Samples
2.1.4 QC/QA Samples
2.3 Sample Collection Methods
2.4 Sample Containers
2.5 Sample Preservation
2.6 Identification
2.7 Transportation and Custody
SECTION 3.0 ANALYSES
3.1 Parameters
3.2 Analytical Methods
3.3 Laboratory QC/QA
SECTION 4.0 DATA ANALYSIS AND REPORTING
SECTION 5.0 PROGRAM CONTROLS
SECTION 6.0 AIR MONITORING

6.4 Project Organization and Responsibility. The project organization for the prime contractor and any subcontractors shall be clearly defined with a discussion of quality control responsibilities. The AE's Quality Control (QC) Officer shall report to a responsible senior officer of the company, that is, QC management shall be separate from project management. A list of key individuals shall be provided , including those with QC responsibilities.

The project-related qualifications of the AE's analytical laboratory shall be addressed in terms of equipment, facilities, and personnel. Names of laboratory supervisors, chemists, technicians and QC officers shall be given with brief resumes chronologically listing education and experience. The project schedule and list of responsible persons shall be stated.

6.5 Sampling. Unless otherwise specified in this SOW and contract, all sampling and sample custody procedures shall be consistent with EPA and State of New York guidelines.

6.5.1 Selection of Sampling Locations. For sampling sites to be chosen in the field, the plan shall describe the rationale that will govern their selection. The plan shall provide the location of each known sampling point on a site map. The plan shall discuss geological and hydrological influences on sample location, and provisions to insure that samples are representative of the site through the use of appropriate field control samples.

6.5.2 Samples to be Collected. The plan shall list or tabulate the samples to be collected, showing the number of samples, types, locations and analytes. The list shall include field controls. Samples collected and prepared in the field shall include: soil samples; groundwater samples, and field control samples, as described in succeeding paragraphs.

6.5.2.1 Soil Samples. The plan shall list or tabulate samples to be collected from the soil borings and test pits for chemical analysis, indicating number, location, depth and analyses required.

6.5.2.2 Groundwater Samples. Each of the groundwater monitoring wells shall be sampled once, by the procedure specified in Paragraph 6.5.3.2. All sampling of wells installed under this delivery order shall be accomplished within a period not exceeding five consecutive days. All samples to be analyzed for metals shall be filtered at the time of collection through filter membranes with a nominal pore size of 0.45 microns.

6.5.2.3 Field Control Samples. A minimum of 10% of all groundwater samples collected shall be QC/QA (5% QC, 5% QA). At least two sampling blanks (1 QC, 1 QA) and two duplicates (1 QC, 1 QA) shall be collected. If samples are to be tested for volatiles, at least two travel blanks shall be included

(1 QC, 1 QA). A minimum of 10% of all soil samples collected shall be QC/QA (5% QC 5% QA). Soil QC/QA shall be splits/duplicates. At least two duplicates/splits shall be collected (1 QC/1 QA).

6.5.2.4 Summary. The types and numbers of samples required are summarized in "Types and Numbers of Samples Collected", Table 1.

6.5.3 Sample Collection Methods and Equipment. The plan shall include specific sampling procedures and equipment to be used to collect the various samples. Appropriate references or descriptions shall be given as needed including sample sizes, containers, equipment, etc. Collection and preservation methods shall be consistent with the specified analytical methods and other standards.

6.5.3.1 Prevention of Cross-Contamination. The plan will describe cleaning of equipment and precautions for preventing contamination of samples during collection.

6.5.3.2 Groundwater Sampling. Before a sample is collected from a well, the depth to water from the surveyed reference point shall be measured and recorded. Then the well shall be pumped or bailed with clean equipment to remove a quantity of water equal to at least five times the submerged volume of the casing. If the well does not recharge fast enough to permit removing five casing volumes, the well shall be pumped or bailed dry, and allowed to recharge for four hours. If the well has recharged to greater than 50 percent of the static water level, then two to three well volumes shall be removed. If the well does not recover to 50 percent of the static water level in four hours, then the well shall be pumped dry a second time and sampled as soon as sufficient recharge has occurred. The sample taken from the well for chemical analyses shall be collected from the screened portion of the well and not from the overlying riser section or the underlying sand-sump section of the well. The plan shall describe details of the sample collection procedure.

6.5.3.3 Collection of Soil Samples. The plan shall include complete details of the proposed procedure for collecting soil samples.

6.5.4 Sample Containers. List the composition and volume of containers to be used according to sample type (soil, water, air, etc.) and analyte. Describe cleaning and other preparation of containers.

6.5.5 Sample Preservation. List or tabulate the required preservation methods and maximum holding times, by sample type and analyte.

6.5.6 Identification. Describe the proposed system for identifying, labeling and tracking samples. Include recording of field data in permanently bound notebooks, and the system for relating field data to the proper samples.

6.5.7 Transportation and Custody. Describe packing, shipping or other transportation and custody documentation, in accordance with "Sample Handling Procedures," HND Guideline, September, 1986.

6.6 Analyses.

6.6.1 Parameters. The plan shall tabulate the samples to be collected and analyses to be performed. Tables 1 and 2 lists required analyses and approved methods. Analysis as listed in the Table shall be performed on each field sample as well as on field controls sent to the AE's laboratory or subcontract laboratory. Laboratory controls (internal QC samples) are not listed, but shall be included in the approved QAPP. Alternate methods and variation in procedures to those in the Tables may be used if approved by the CO and described in the approved plan.

6.6.2 Analytical Methods. Each proposed method must be specified exactly and in detail by one of the following: (1) Reference to an accepted published method, e.g., an EPA, SM, or ASTM method, if the published procedure is followed exactly, or (2) reference to an accepted published method with a description of any deviations from the published procedure, or (3) complete description of the procedure, e.g., copies of laboratory instructions. Descriptions of any pre-treatment or preparation of the sample required before the actual analysis shall be included. Include the required concentration ranges, and data on the sensitivity (detection limits), precision and accuracy, by analyte and sample matrix in the descriptions of methods. Detection limits shall correspond to the Contract Laboratory Program of the USEPA. Indicate how pre-existing data on sensitivity, precision and accuracy were determined, and procedures to be used to validate the methods for the matrices in question.

6.7 Data Analysis and Reporting. For each analytical method and major measurement parameter, the following information shall be provided:

6.7.1. The data analysis scheme including units and equations required to calculate concentrations or the value of the measured parameter.

6.7.2. Plans for treating results that appear unusual or questionable. Describe the feedback systems used to identify problems by means of the results obtained from control samples. Limits of data acceptability shall be included with the corrective action to be taken when these limits are exceeded. Personnel responsible for initiating and carrying out corrective action shall be indicated. Describe how re-establishment of control is demonstrated. Unacceptable contamination levels in blanks, and the maximum acceptable disagreement between replicate samples and between field duplicate/split samples shall be stated in the Quality Assurance Project Plan. These limits shall correspond to those required by the Contract Laboratory Program of the USEPA. Corrective action to be taken when these limits are exceeded shall be described, and the circumstances that require collection of new samples at no additional cost to the Government shall be specified.

6.7.3. Description of the data management systems, including the collection of raw data, data storage and data quality assurance documentation.

6.7.4. Identification of individuals to be involved in the reporting sequence.

6.7.5. Description or illustration of the proposed data reporting format. Only quantified concentrations of analytes shall be reported.

6.7.6. Procedures to assess the precision, accuracy and completeness of all measurement parameters. The AE shall report precision based on standards and known additions. If statistical procedures are used for data review before reporting, include descriptions.

6.8 Program Controls

6.8.1 Calibration Procedures and Frequency. List field and laboratory instrumentation, specifying manufacturers, models, accessories, etc., with procedures used for calibration and frequency of checks. The instrumentation and calibration should be consistent with the requirements of the contract and the analytical method requirements.

6.8.2 Internal Quality Control Checks. Internal quality control checks are necessary to evaluate performance reliability for each measurement parameter. The numbers and types of internal QC checks and samples proposed (e.g. blanks, duplicates, splits, "spiked" samples and reference standards, as applicable) shall be defined clearly in the work plan and summarized by methods and analytes. The laboratory's established practice for including control samples among the samples tested, and any additional controls required by the present project, shall be described.

6.8.3 Preventive Maintenance. A system for preventive maintenance for facilities and instrumentation shall be described. Preventive maintenance shall be performed by qualified personnel. Records shall be maintained and shall be available for inspection by the CO on request and subsequent repairs, adjustments and calibrations shall be recorded.

6.8.4 External Certification. Prior to any sampling activities under this SOW, the AE's analytical laboratory must be validated by the US Army Corps of Engineers, Missouri River Division (CEMRD-ED-GC, 402-221-7324) or its representative for the contaminants of concern. It is the responsibility of the AE's laboratory to achieve validation from CEMRD independent of CEHND and this delivery order. The AE should start the validation process as soon as this delivery order is awarded since the process takes approximately six (6) to eight (8) weeks.

6.8.5 Laboratory QC. Laboratory QC results shall be submitted to the QA laboratory as soon as it becomes available.

6.9 Definitions. The following terms and meanings are given as they are applied here, since usage and terminology in this field are not yet standardized.

6.9.1 Field Blank Sample is a trip blank, rinsate sample, field background soil blank sample submitted with the field samples for QC/QA purposes.

6.9.2 Field Control Samples are field splits, duplicates/replicates and Field Blank Samples submitted with the field samples for QC/QA purposes.

6.9.3 Trip or Travel Blanks are Type II Reagent Grade organic-free deionized water in 2 x 40 mL VOA vials that accompany the sample containers to the field and back to the laboratory. Trip blanks are used only for coolers

containing aqueous samples for volatile organic analysis. These blanks, as well as all other samples being submitted for volatile organic analysis, are to contain no headspace.

6.9.4 Rinsate Blanks are collected rinse water (Type II Reagent Grade) from the final rinses of the sampling equipment. Rinsate blanks are to be used in conjunction with volatile, semi-volatile and in-organic analysis of water samples. Sample preservation and containers shall be appropriate for the analytes of interest.

6.9.5 Soil Blanks (Background) are used to establish background levels of metals and other analytes in soils. These are normally collected from visually clean soil near the site. The field background soil blank sample is usually counted along with the field samples. It is collected in duplicate and submitted to the AE's laboratory and the QA laboratory along with the field samples.

6.9.6 Splits are two or more subsamples of one large sample. These are taken after compositing a large soil sample (after samples for volatile analyses have been removed). Splits are used for both QA and QC purposes for soil samples for all analytes excluding volatiles. It is acceptable to split soil samples into three portions after compositing (field sample, split for QA, and split for QC).

6.9.7 Duplicates or Triplicates are separate samples collected at the same location and time as the original sample. Duplicates or triplicates are preferred over splits for volatile organic analyses of soil samples because compositing leads to loss of volatile components. Water samples for QA/QC checking are also duplicate or triplicate samples.

6.9.8 Check/Calibration Standards are used to calibrate field instruments such as the VOA meter and are used to establish control limits for analytical parameters.

6.9.9 Quality Assurance Samples are collected by the sampling team for use by the government's QA laboratory. The purpose of the sample in to assure the government that the data generated by the AE's analytical laboratory are of suitable quality.

6.9.10 Quality Control Samples are collected by the sampling team for use by the AE's laboratory. The identity of these samples is held blind to the analysts and laboratory personnel until data are in deliverable form. The purpose of the sample is to provide site specific field originated checks that the data generated by the AE's analytical laboratory are of suitable quality.

6.9.11 Internal QC Sample or Laboratory Control. A reference standard, standard addition, replicate sample, blank or other sample are samples in which the analyte concentration is known or can be calculated, which is placed among the samples to be analyzed in order to evaluate or demonstrate validity of the analytical results.

6.9.12 Reference Standard. A sample prepared from pure reagents to contain one or more analytes at known concentrations.

6.9.13 Standard Addition or "Spiked" Sample. A field sample to which known concentrations of one or more analytes have been added.

6.9.14 Laboratory Replicate Samples. Subsamples of a single field sample which are divided at the laboratory and analyzed as separate samples.

6.9.15 Replicate Analyses. Multiple analyses performed on the same sample.

6.9.16 Laboratory Blank. A sample prepared at the laboratory from pure materials containing none of the analyte. Laboratory blanks include method blanks, reagent blanks and others.

TABLE 1
Total Types and Numbers of Samples Collected
SUMMARY OF BASIC CONTRACT REQUIREMENTS

		Quality Assurance and Quality Control					
	Field	Splits/Dups		Rinsates		Trip Blanks	
	Samples	QC(AE)	QA(CE)	QC(AE)	QA(CE)	QC(AE)	QA(CE)
GROUNDWATER(1):							
Volatiles	20	1	1	1	1	1	1
B/N/A						NR	NR
Pesticides/PCB's						NR	NR
TRPH						NR	NR
Total Metals	20	1	1	1	1	NR	NR
Total Dis. Metal	20	1	1	1	1		
SURFACE WATER(2):							
Volatiles	10	1	1	1	1	1	1
B/N/A						NR	NR
Pesticides/PCB's						NR	NR
TRPH						NR	NR
Total Metals	10	1	1	1	1	NR	NR
Total Dis. Metal	10	1	1	1	1		
SURFACE SOILS:							
Volatiles				NR	NR	NR	NR
B/N/A				NR	NR	NR	NR
Pesticides/PCB's				NR	NR	NR	NR
TRPH				NR	NR	NR	NR
Metals				NR	NR	NR	NR
Other:_____				NR	NR	NR	NR
SUBSURFACE SOILS(3):							
Volatiles	50	3	3	NR	NR	NR	NR
B/N/A				NR	NR	NR	NR
Pesticides/PCB's				NR	NR	NR	NR
TRPH				NR	NR	NR	NR
Metals	50	3	3	NR	NR	NR	NR
EP TOX	50	3	3	NR	NR	NR	NR

(1) At least one monitoring well shall sampled to check "background."
(2) One of the surface water samples shall be collected to test "background."
(3) Field samples must include at least one "background" soil sample from each area.

TABLE 2-17
Types and Numbers of Samples Collected

		Quality Assurance and Quality Control					
	Field	Splits/Dups		Rinsates		Trip Blanks	
	Samples	QC(AE)	QA(CE)	QC(AE)	QA(CE)	QC(AE)	QA(CE)
GROUNDWATER:							
Volatiles	_____	_____	_____	_____	_____	_____	_____
B/N/A	_____	_____	_____	_____	_____	NR	NR
Pesticides/PCB's	_____	_____	_____	_____	_____	NR	NR
TRPH	_____	_____	_____	_____	_____	NR	NR
Metals	_____	_____	_____	_____	_____	NR	NR
Other:_____	_____	_____	_____	_____	_____	_____	_____
SURFACE WATER:							
Volatiles	_____	_____	_____	_____	_____	_____	_____
B/N/A	_____	_____	_____	_____	_____	NR	NR
Pesticides/PCB's	_____	_____	_____	_____	_____	NR	NR
TRPH	_____	_____	_____	_____	_____	NR	NR
Metals	_____	_____	_____	_____	_____	NR	NR
Other:_____	_____	_____	_____	_____	_____	_____	_____
SURFACE SOILS:							
Volatiles	_____	_____	_____	NR	NR	NR	NR
B/N/A	_____	_____	_____	NR	NR	NR	NR
Pesticides/PCB's	_____	_____	_____	NR	NR	NR	NR
TRPH	_____	_____	_____	NR	NR	NR	NR
Metals	_____	_____	_____	NR	NR	NR	NR
Other:_____	_____	_____	_____	NR	NR	NR	NR
SUBSURFACE SOILS:							
Volatiles	50	3	3	NR	NR	NR	NR
B/N/A	_____	_____	_____	NR	NR	NR	NR
Pesticides/PCB's	_____	_____	_____	NR	NR	NR	NR
TRPH	_____	_____	_____	NR	NR	NR	NR
Metals	50	3	3	NR	NR	NR	NR
EP TOX	50	3	3	NR	NR	NR	NR

TABLE 2-18
Types and Numbers of Samples Collected

		Quality Assurance and Quality Control					
	Field	Splits/Dups		Rinsates		Trip Blanks	
	Samples	QC(AE)	QA(CE)	QC(AE)	QA(CE)	QC(AE)	QA(CE)
GROUNDWATER:							
Volatiles	20	1	1	1	1	1	1
B/N/A						NR	NR
Pesticides/PCB's						NR	NR
TRPH						NR	NR
Total Metals	20	1	1	1	1	NR	NR
Total Dis. Metal	20	1	1	1	1		
SURFACE WATER:							
Volatiles	10	1	1	1	1	1	1
B/N/A						NR	NR
Pesticides/PCB's						NR	NR
TRPH						NR	NR
Total Metals	10	1	1	1	1	NR	NR
Total Dis. Metal	10	1	1	1	1		
SURFACE SOILS:							
Volatiles				NR	NR	NR	NR
B/N/A				NR	NR	NR	NR
Pesticides/PCB's				NR	NR	NR	NR
TRPH				NR	NR	NR	NR
Metals				NR	NR	NR	NR
Other:_____				NR	NR	NR	NR
SUBSURFACE SOILS:							
Volatiles				NR	NR	NR	NR
B/N/A				NR	NR	NR	NR
Pesticides/PCB's				NR	NR	NR	NR
TRPH				NR	NR	NR	NR
Metals				NR	NR	NR	NR
Other:_____				NR	NR	NR	NR

TABLE 3
SUGGESTED METHODS FOR SAMPLE ANALYSIS

Analyte	Technique	Soil	Groundwater	Surface Water(1)
Arsenic (As)	GF	3050/7060	7060	206.2
	H	7061	7061	206.3
Barium (Ba)	DA	3050/7080	3005/7080	208.1
	GF	----	----	208.2
	ICP	3050/6010	3005/6010	200.7
Cadmium (Cd)	DA	3050/7130	3005/7130	213.1
	GF	3050/7131	3020/7131	213.2
	ICP	3050/6010	3005/6010	200.7
Chromium (Cr)	DA	3050/7190	3005/7190	218.1
	GF	3050/7190	3020/7191	218.2
	ICP	3050/6010	3005/6010	200.7
Lead (Pb)	DA	3050/7420	3005/7420	239.1
	GF	3050/7421	3020/7421	239.2
	ICP	3050/6010	3005/6010	200.7
Mercury (Hg)	CV	7471	7470	245.1
Selenium (Se)	GF	3050/7740	7740	270.2
	H	7741	7741	270.3
Silver (Ag)	DA	7760	7760	272.1
	GF	----	----	272.2
	ICP	3050/6010	3005/6010	200.7
EP Toxicity	---	1310	----	----
Volatile Organics	GC/MS	8240	8240	624

DA=Direct Aspiration
GF=Graphite Furnace
H=Hydride
CV=Cold Vapor
ICP=Inductively Coupled Plasma
GC=Gas Chromatograph
GC/MS=Gas Chromatograph/Mass Spectroscopy

(1) Surface water samples may also be analyzed by the SW-846 methods listed for groundwater.

(2) USATHAMA Methods.

7.0 SOIL BORING AND MONITORING WELL REQUIREMENTS.

The following requirements shall be incorporated into the AE's Soil Boring and Monitoring Well Installation Plan and followed in the field. The plan shall be prepared using the following outline as applicable:

SECTION 1.0 INTRODUCTION AND BACKGROUND

SECTION 2.0 WELL AND BORING LOCATIONS AND DEPTHS

SECTION 3.0 DRILLING EQUIPMENT

SECTION 4.0 DRILLING PROCEDURES

SECTION 5.0 CONTAMINATION PREVENTION AND DECONTAMINATION PROCEDURES

SECTION 6.0 WELL DESIGN AND INSTALLATION

SECTION 7.0 WELL DEVELOPMENT

SECTION 8.0 IN-SITU PERMEABILITY

SECTION 9.0 PROJECT ASSIGNMENTS & PERSONNEL QUALIFICATIONS

7.1. Location. Monitoring well locations shall be proposed by the AE as part of the plan prior to commencement of drilling activities. The AE shall obtain written approval from the facility engineer, to drill at each site to avoid disturbing buried utilities.

7.2. Design of Monitoring Wells. The design and installation of all monitoring wells shall follow as closely as practical the design for properly installed, low-yield domestic water supply wells. Recommended practices for such wells are set out in "Manual of Water Well Construction Practices", U.S. EPA Publ. EPA 570/9-75-001 (Reference 11.2). Additional design recommendations are given in "Procedures Manual for Groundwater Monitoring at Solid Waste Disposal Facilities", USEPA Publ. No. EPA 530/SW-611 (Reference 11.1). State and local certification requirements for drillers shall be met. State and local design and installation requirements shall be met. The AE shall be responsible for obtaining any soil boring or well drilling permits required by state or local authorities and for complying with state or local regulations concerning submission of well logs and samples.

7.3 Containerization of Drill Cuttings and Development Water. The AE shall contain all drill cuttings and well development water in DOT approved 55 gallon drums. The AE shall, at the end of each phase of drilling, provide documentation based upon the results of the required chemical analyses,

evaluation of site conditions and knowledge of regulatory requirements, which recommend the disposition for each drum of waste. For each drum considered to contain regulated amounts of hazardous waste, the AE shall recommend a specific, optimum disposal method, along with the price for disposal. The AE shall label and manifest, according to RCRA regulations, each drum of material which is to be handled as hazardous waste. Actual disposal shall be the responsibility of the Government.

7.3. Installation of Monitoring Wells.

7.3.1 General Requirements. The AE shall provide all drilling equipment, materials and personnel required to install the wells, as well as a qualified geologist or geotechnical engineer who shall be on-site for all drilling, installation, development and testing operations. The AE shall submit proposed drilling methods in the Monitoring Well Installation Plan. Any changes to the approved drilling methods must be submitted to the Contracting Officer for prior approval.

7.3.2. Protection of Water Yielding Zones. The use of any liquid, including water, is to be avoided during drilling and will only be permitted by the Contracting Officer in cases where he determines that it is absolutely necessary for successful installation of the well. If water is required during drilling or well installation, only non-chlorinated potable water will be permitted. Any proposed use of water must be approved by the Contracting Officer beforehand. Grease or oil on drill rod joints will not be permitted. Dispersing agents (such as phosphates) or acids shall not be used. There shall be no attempt made to chemically disinfect the well. The rigs, drill tools, and associated equipment shall be cleaned with steam and washed and rinsed with a decontaminating liquid prior to commencement of drilling at each well and boring location. It is expressly required that toxic and/or contaminating substances shall not be used during any part of the drilling, well installation or well development processes. All drilling activities and methods shall be sufficient to prohibit the introduction of contaminants from one water bearing stratum to another via the well bore or completed well.

7.3.3 Well Design.

7.3.3.1 Boring Diameter. The boring shall be of sufficient diameter to permit at least two (2) inches of annular space between the boring wall and all sides of the centered riser and screen.

7.3.3.2 Well Riser and Screen.

7.3.3.2.1 Riser. Well riser shall consist of new threaded, flush joint, stainless steel pipe with a two (2) inch nominal diameter. Well risers shall, as a minimum, conform to the requirements of ASTM D-1785 Schedule 40 pipe and shall is clearly identified as the material which is specified.

7.3.3.2.2 Screen. The well screen shall be five (5) feet in length and shall be constructed of stainless steel similar to the well riser. The screen shall be noncontaminating, factory constructed and of "continuous wrap" or "mill-slot" design. Field slotted or cut screen is not permitted. The slot size shall be determined by the AE and designed to be compatible with aquifer and filter pack material. The AE shall provide a sieve analysis of one or more representative samples of the aquifer material in which the screen is placed and which demonstrates that the screen is compatible with the aquifer material. The sieve analysis shall be conducted in accordance with ASTM C 117 and C 136 and results shall be submitted to the Contracting Officer with the field boring logs.

7.3.3.2.3 Screen Location. The AE shall have the responsibility of placing the well screen in the appropriate location in the bore hole so that the completed monitoring well functions satisfactorily.

7.3.3.2.4 Sand-Sump. There shall be a 2-foot minimum length "sand-sump" placed below the base of the screen. The sand-sump shall be a blank section of riser conforming to the requirements of riser as described above. The sand-sump will be installed only if the screen can be placed at the appropriate interval without the sand-sump penetrating any underlying aquitards.

7.3.3.2.5 Joining Screen and Riser. Screen and riser sections shall be joined by threaded, flush-joint couplings, to form watertight unions, that retain 100% of the strength of the screen. Solvent glue shall not be

used at any time in construction of the wells. The bottom of the deepest screen or casing section shall be sealed with a threaded cap or plug of inert, non-corroding material similar in composition to the screen itself.

7.3.3.2.6 Well Plumbness and Alignment. All risers and screens shall be set round, plumb, and true to line. Centralizers shall be used to assure plumbness and alignment of the wells. Centralizers shall not be installed on the well screen.

7.3.3.3 Filter Pack. The AE shall select and use clean, inert, siliceous materials to construct a uniform and continuous filter pack designed to prevent migration of fines into the screen. Carbonate or crushed stone material shall not be used. The filter pack shall be placed by tremie pipe from the bottom of the boring to approximately two (2) feet above the top of the well screen. Natural development methods may be used when appropriate.

7.3.3.4 Bentonite Seal and Grout. A minimum two (2) foot seal, consisting of tamped bentonite pellets or bentonite slurry shall be placed into the annular space between the riser and boring wall at the top of the filter pack. Non-shrinking cement grout shall then be placed from the top of the bentonite seal to the ground surface. The cement grout shall consist of a mixture of portland cement (ASTM C-150), and water in the proportion of not more than seven (7) gallons of clean water per bag of cement (One cubic foot or 94 pounds). Additionally, 3% by weight of bentonite powder shall be added if permitted by State regulations.

7.3.4 Soil Sampling for Geotechnical Analysis. During drilling of soil borings and monitoring wells, soil samples shall be collected and geotechnical analysis shall be performed as outlined below.

7.3.4.1 Dry, hollow stem or solid auger methods of drilling shall be used wherever subsurface conditions allow.

7.3.4.2 Soil samples shall be taken continuously for the first 10 feet and at 5-foot intervals thereafter.

7.3.4.3 Sampling shall be done with a split-spoon sampler (ASTM D-1586) or thin wall sampler (ASTM D-1587) using standard sampling techniques.

7.3.4.4 Samples shall be stored in labeled, air-tight plastic or glass containers by the AE until such time as they are needed for testing or the contract is complete.

7.3.4.5 All soil samples shall be visually classified by the Unified Soil Classification System. The AE shall verify the classification by laboratory analyses consisting of the following:

Test Description	# Required/ Well
a. Grain-size distribution (ASTM D-421 & 422)	3
b. Atterburg limits (ASTM D-423 & 424)	3
c. Moisture content (ASTM D-2216)	3

Specific soil samples to be tested, along with type of test, will be determined by the AE after reviewing the boring logs. Laboratory analyses shall use equipment and methods described in EM-1110-2-1906 or ASTM manuals.

7.3.5 Protection of Well. At all times during the progress of the work, precautions shall be used to prevent tampering with the well or the entrance of foreign material into it. Upon completion of the well, a suitable vented cap shall be installed to prevent material from entering the well. The well riser shall be surrounded by a larger diameter steel casing set into a concrete pad and rising 24" to 36" above ground level. The steel casing shall be provided with lock and cap. A minimum three foot square, four inch thick concrete pad, sloped away from the well shall be constructed around the well casing at the final ground level elevation. A survey marker shall be permanently placed in each pad as detailed in Section 8.0 of this SOW. Four, two-inch or larger diameter steel posts shall be equally spaced around the well and embedded in the concrete pad. The ground immediately surrounding the top of the well shall be sloped away from the well. There shall be no openings in the protective casing wall below its top.

7.3.6 Temporary Capping. Any well that is to be temporarily removed from service, or left incomplete due to delay in construction, shall be capped with a watertight cap and equipped with a "vandal proof" cover satisfying applicable state or local regulations or recommendations.

7.3.7 Field Logs. The field geologist or geotechnical engineer shall maintain suitable logs detailing drilling and well construction practices. One copy of each field log including the required color slides, shall be submitted to the Contracting Officer not later than 10 calendar days after each well is completed. The well will not be accepted by the Contracting Officer until the logs are received and approved. Information provided in the logs shall include but not be limited to the following:

7.3.7.1 Reference elevation for all depth measurements.

7.3.7.2 Depth of each change of stratum.

7.3.7.3 Thickness of each stratum.

7.3.7.4 Identification of the material of which each stratum is composed according to the Unified Soil Classification System, or standard rock nomenclature, as necessary.

7.3.7.5 Depth interval from which each formation sample was taken.

7.3.7.6 Depth at which hole diameter (bit sizes) change.

7.3.7.7 Depth at which groundwater is first encountered.

7.3.7.8 Depth to the static water level and changes in static water level with well depth.

7.3.7.9 Total depth of completed well.

7.3.7.10 Depth or location of any loss of drill water circulation, loss of tools or equipment.

7.3.7.11 Location of any fractures, joints, faults, cavities or weathered zones.

7.3.7.12 Depth of any grouting or sealing.

7.3.7.13 Nominal hole diameters.

7.3.7.14 Amount of cement used for grouting or sealing.

7.3.7.15 Depth and type of well casing.

7.3.7.16 Description (to include length, location, diameter, slot sizes, material, and manufacturer) of well screen(s).

7.3.7.17 Any sealing-off of water-bearing strata.

7.3.7.18 Static water level upon completion of the well and after development.

7.3.7.19 Drilling date or dates.

7.3.7.20 Construction details of monitoring well.

7.3.8 Final Logs. The field logs shall be edited and drafted for inclusion into the final report.

7.4. Well Development. After each well has been constructed, but no sooner than 48 hours after grouting is completed, the AE shall direct a program for the development of the well by pumping and/or surging, without the use of acids, dispersing agents or explosives. Development shall continue for a period of 4 hours (minimum), and until groundwater removed from the well is clear and free of sand and drilling fluids and until parameter (pH, temperature, etc.) stabilization has occurred. No water or other liquid may be introduced into the well other than formation water from that well. After final development of the well, the AE shall collect approximately 1 liter of water from the well in a clear glass jar, place the jar in front of a standard color chart, and photograph it with a 35mm color slide. The AE shall shake the jar of well development water immediately prior to photography to ensure that all solids are suspended. The AE shall submit the slide as part of the well log. The photograph shall be a suitably back-lit close up which shows the clarity or turbidity of the water.

7.5. In-Situ Permeabilities. After development of monitoring wells, the AE shall calculate for each, the in-situ permeability of the screened stratum in accordance with "Methods of Determining Permeability, Transmissibility and Drawdown," or other equivalent methods. However, no water or other liquid may be introduced into the well other than formation water from that well.

7.6. AE Responsibility for Monitoring Wells.

7.6.1 It is the responsibility of the AE to properly plan, design, install, develop, and test monitoring wells so that they are suitable to produce groundwater samples representative in quantity and quality of subsurface conditions. The AE shall ensure that the requirements of this scope of work and best construction practices are carried out.

7.6.2 If the AE, due to his inadequate design or construction, installs monitoring wells that are not functional or not in accordance with specifications, the Contracting Officer will disapprove the well and direct the AE to repair or replace it at the Contacting Officer's discretion. This work shall be done at no additional cost to the Government.

7.6.3 If a monitoring well is disapproved by the Contracting Officer, or is abandoned by the AE for any reason, the hole shall be backfilled with neat cement grout from top to bottom by the AE at no additional cost to the Government.

8.0 SURVEY REQUIREMENTS.

8.1 Control Points. Plastic or wooden hubs shall be used for all basic control points. A minimum of three (3) concrete monuments with 3.25-inch domed brass or aluminum alloy survey markers (caps) and witness posts shall be established at the site. The concrete monuments shall be located within the project limits, be set 50 feet from the edge of any existing roads in the interior of the project limits and be a minimum of 1,000 feet apart. The placement of all monuments, hubs etc., shall be coordinated with SEAD to prevent destruction due to regular landscaping activities. Horizontal control (1:10000) and vertical control (1:5000) of third order or better shall be established for the network required for all the monuments. The caps for the new monuments shall be stamped in a consecutively numbered sequence as follows:

SEAD-1-1989	SEAD-2-1989	SEAD-3-1989
USAED-HUNTSVILLE	USAED-HUNTSVILLE	USAED-HUNTSVILLE

The dies for stamping the numbers and letters into these caps shall be of 3/16-inch in size. All coordinates are to be referenced to the State Plane Coordinate System and all elevations are to be referenced to the 1929 North American Vertical Datum.

8.2 Location Surveys. A 3.25-inch diameter domed survey marker (cap) composed of brass, bronze or aluminum alloy shall be permanently set in the concrete pad surrounding each well. Coordinates and elevations shall be established for each boring and monitoring well. The coordinates shall be to the closest 1.0-foot and referenced to the State Plane Coordinate System. Elevations to the closest 0.01-foot shall be provided for the survey marker and for top of the casing at each well. These elevations shall be referenced to the National Geodetic Vertical Datum of 1929.

8.3 The location, identification, coordinates and elevations of all the control points recovered and/or established at the site, and all of the wells, soil borings, test pits, and surface water sampling points shall be plotted on a planimetric map (at a scale of 1"=50 feet) to show their location with respect to surface features within the project area. A tabulated list of the monuments and the monitoring wells, including their coordinates and elevations, a "Description Card" for each monument established or used for this project and all field books and computations shall be prepared and submitted to the Huntsville Division (CEHND), ATTN: CEHND-ED-CS. The tabulation shall consist of the designated number of the well or monument, the X- and Y-coordinates and all the required elevations. The Description Card shall show a sketch of each monument; its location with relative to reference marks, buildings, roads, towers, etc.; a written description telling how to locate the monument from a known point; the monument name or number and the adjusted coordinates and elevations. These items shall be submitted to CEHND no later than the Draft Report Submission.

9.0 SECURITY REQUIREMENTS

9.1 The following requirements must be followed by the AE at Seneca Army Depot to facilitate entry and exit of AE employees and to maintain security.

9.1.1 Personnel Registration:

9.1.1.1 A list of all AE employees, sub-contractors and suppliers indicating firm name and address will be furnished through POC/COR to the Counterintelligence Division, Building 710, 72 hours prior to commencement of work.

9.1.1.2 A confirmation of employment SDSSE-SC Form 268 will be executed by the AE concerning each employee, to include all sub-contractors and their personnel. No forms will be transferred to another file if the AE has other on-going contracts at SEAD. The AE will provide a list of personnel who are authorized to sign Form 268 for the firm. A sample of each signature is required. Counterintelligence Division must be notified, in writing, of any changes to this list. All completed forms will be provided through COR/POC to the Counterintelligence Division 72 hours prior to commencement of work. Failure to complete Form 268 correctly will result in employee's denial of access to Seneca. The Counterintelligence Division must be notified, in writing through POC/COR to Counterintelligence, at least 72 hours prior to requesting any action. The chain of command for all AE actions will be through POC/COR to Counterintelligence Division. There will be no exceptions.

9.1.1.3 Camera permits require written notice from the POC/COR prior to access. Open camera permits will not be issued. The following information is required:

(a) Camera make, model and serial number.

(b) Contract name and name of individual responsible for the camera.

(c) Dates camera will be used.

(d) Where it will be used.

(e) What will be photographed and why.

9.1.1.4 If a rental, leased or privately owned vehicle is required in place of a company vehicle, the following information is needed.

(a) Name of individual driving.

(b) Year, make, model, color and license plate of the vehicle.

(c) Typed letter on company letterhead indicating that the company assumes responsibility for rental, leased or privately owned vehicles.

9.1.1.5 All access media will be destroyed upon expiration date of contract. If an extension is required a list of employee names and new expiration date must be furnished to the Counterintelligence Division. Contract extensions must be made prior to the contract expiration date or new Form 268s will be required for each individual that requires an extension.

9.1.2 Traffic Regulations:

9.1.2.1 Traffic Laws, State of New York, apply with emphasis on the following regulations.

9.1.2.2 Speed Limit:	Controlled Area	- as posted
	Ammo Area	- 50 mph
	Limited/Exclusion Area	- 25 mph

9.1.2.3 All of the above are subject to change with road conditions or as otherwise posted.

9.1.3 Parking: AE vehicles (trucks, rigs, etc.) will be parked in areas designated by the Director of Law Enforcement and Security. Usually parking will be permitted within close proximity to the work site. Do not park within 30 feet of a depot fence, as these are clear zones.

9.1.4 Gates:

9.1.4.1 Post 1, Main Gate - NY Highway 96, Romulus, New York is open for personnel entrance and exit 24 hours daily, 7 days a week.

9.1.4.2 Post 3, entrance to North Depot Troop Area, located at end of access road from Route 96-A is open 7 days a week for personnel and vehicle entrance and exit.

9.1.5 Security Regulations:

9.1.5.1 Prohibited Property:

9.1.5.1.1 Cameras, binoculars, weapons and intoxicating beverages will not be introduced to the installation, except by written permission of the Director/Deputy Director of Law Enforcement and Security.

9.1.5.1.2 Matches or other spark producing devices will not be introduced into the Limited/Exclusion or Ammo Area's except when the processor of such items is covered by a properly validated match or flame producing device permit.

9.1.5.1.3 All vehicles and personal parcels, lunch pails, etc. are subject to routine security inspections at any time while on depot property.

9.1.5.1.4 All building materials, equipment and machinery must be cleared by the Director of Engineering and Housing who will issue a property pass for outgoing equipment and materials.

9.1.6 AE Employee Circulation:

9.1.6.1 AE employees are cleared for entrance to the location of contract work only. Sight-seeing tours or wandering from work site is NOT AUTHORIZED.

9.1.6.2 Written notification will be provided to the Counterintelligence Division (Ext. 30202) at least 72 hours prior to overtime work or prior to working on non-operating days.

9.1.6.3 Security Police (Ext. 30448/30366) will be notified at least two hours in advance of any installation or movement of slow moving heavy equipment that may interfere with normal flow of traffic, parking or security.

9.1.7 Unions: Representatives will be referred to the Depot Industrial Labor Relations Officer (Ext. 41317).

9.1.8 Offenses: (Violations of law or regulations)

9.1.8.1 Minor: Offenses committed by AE personnel which are minor in nature will be reported by the Director of Law Enforcement and Security to the Contracting Officer who in turn will report such incidents to the AE for appropriate disciplinary action.

9.1.8.2 Major: Serious offenses committed while on the installation will be reported to the FBI. Violators may be subject to trial in Federal Court.

9.1.9 Explosive Laden Vehicles:

9.1.9.1 Vehicles such as vans, cargo trucks, etc. carrying explosives will display placards or signs stating "EXPLOSIVES".

9.1.9.2 Explosive ladened vehicles will not be passed.

9.1.9.3 When an explosive laden vehicle is approaching, pull over to the side and stop.

9.1.9.4 When catching up with an explosive laden vehicle, slow down and allow that vehicle to remain at least 100 feet ahead.

9.1.9.5 When approaching an intersection where an explosive laden vehicle is crossing - STOP - do not enter the intersection until such time as the explosive carrier has passed thru, and cleared the intersection.

9.1.9.6 When passing a vehicle that is parked, and displaying "Explosive" signs, slow down to 10 miles per hour, and take every precaution to allow more than ample clearance.

9.1.10 Clearing Post: All AE employees are required to return all identification badges, and passes on the last day of employment on the depot. The AE is responsible for the completion of all turn-ins by his employees, and informing the Counterintelligence Division and the depot organization administering the contract, for termination of any employee's access to the depot.

10.0 PUBLIC AFFAIRS.

The AE shall not publicly disclose any data generated or reviewed under this contract. The AE shall refer all requests for information to CEHND. Reports and data generated under this contract shall become the property of the Department of Defense and distribution to any other source by the AE, unless authorized by the Contracting Officer, is prohibited.

11.0 REFERENCES

11.1 "Procedures Manual for Groundwater Monitoring at Solid Waste Disposal Facilities," USEPA Publ. No. EPA/530/SW-611.

11.2 "Manual of Water Well Construction Practices, " USEPA Publ. NO. EPA/570/9-75-001.

11.3 "Methods of Determining Permeability, Transmissibility, and Drawdown," U.S. Geological Survey Water Supply Paper No. 1536-1, 1963.

11.4 "U.S. Corps of Engineers Safety and Health Requirements Manual," U.S. Army Engineering Manual No. EM-385-1-1, April 1981.

11.5 "Code of Federal Regulations, "Volume 40, Parts 260 through 265 plus 270, July 1986.

11.6 "American Society for Testing and Materials," ASTM D-421, D-422, D-423, D-424, D-2216, and D-2436.

11.7 "Code of Federal Regulation," Volume 40, Part 300, July 1987.

11.8 "Methods for Chemical Analysis of Water and Wastes," U.S. Environmental Protection Agency, Publ. No. EPA/625/6-7-003a.

11.9 "Test Methods for Evaluating Solid Wastes," USEPA Publ. No. SW- 846,

July 1982.

11.10 "Guidelines Establishing Test Procedures for the Analysis of Pollutants Under the Clean Water Act," 40 CFR 136, Federal Register, Oct 26, 1984.

11.11 "RCRA Groundwater Monitoring Technical Enforcement Guidance Document" (Draft) Office of Waste Programs Enforcement, USEPA, August 1985.

11.12 "Handbook for Analytical Quality Control in Water and Wastewater Laboratories," EPA Manual 600/4-79-019, March 1979.

11.13 "Safety and Occupational Health Document Requirements for Hazardous Waste Site Remedial Actions," U.S. Army Engineering Regulation (ER) 385-1-192.

11.14 "Engineer Guidance Design Manual for Architect-Engineer," US Army Corps of Engineer. HNDM-1110-1-1. Rev. 1986.

11.15 RCRA Corrective Action Plan, OSWER Directive 9902.3, November, 1986.

11.16 U.S. Army Toxic and Hazardous Materials Agency (USATHAMA), Initial Installation Assessment of Seneca Army Depot, N.Y. Report no. AMXTH-IR-A-157, 1980.

11.17 U.S. Army Environmental Hygiene Agency (USAEHA), Final Report, Army Pollution Abatement Program Study No. D-1031-W, Landfill Leachate Study, Seneca Army Depot, 1981.

11.18 U.S. Army Toxic and Hazardous Materials Agency (USATHAMA), Update of the Initial Installation Assessment of Seneca Army Depot, N.Y. Report no. AMXTH-IR-A-157(U), 1988.

11.19 "Evaluation of Solid Waste Management Units, Seneca Army Depot", Interim Final Report, Groundwater Contamination Survey No.38-26-0868-88, U.S. Army Environmental Hygiene Agency.

11.20 "Remedial Investigations/Feasibility Studies, Seneca Army Depot Burning Pit/Landfill, Site Investigation", Draft Final Report, ICF Technology Inc., March 1989.

11.21 Draft, "Guidance For Conducting Remedial Investigations/Feasibility Studies Under CERCLA", U.S. EPA, Office of Solid Waste and Emergency Response, March 1988.

11.22 ER 1110-1-263.

(9-292)

19 September 1989

ANNEX G

TREATABILITY STUDY
AT THE
INCINERATOR ASH LANDFILL
SENECA ARMY DEPOT, ROMULUS, NEW YORK

1.0 GENERAL STATEMENT OF SERVICES

1.1 Background. As part of its continuing program of evaluating and upgrading its hazardous waste management facilities, the Army is performing hazardous waste investigations at Solid Waste Management Units (SWMU's) at Seneca Army Depot (SEAD). A recently completed site investigation of the abandoned ash landfill area (SWMU Designations SEAD-3, SEAD-6, SEAD-14 and SEAD-15) has documented the existence of a narrow plume of groundwater contamination which is believed to extend to, and possibly beyond, the Depot's western boundary. The contaminants of concern are chlorinated volatile organic compounds (VOC's); trans-1,2-dichloroethene, trichloroethene and, to a lesser extent, 1,2-dichloroethane, vinyl chloride and chloroform. SEAD has requested the implementation of proposed interim remedial measures to control the plume migration while more detailed studies are being performed to delineate the full extent of the contamination, its source(s) and possible methods of remediation. The US Army Corps of Engineers, Huntsville Division, on behalf of SEAD, is contracting for the required work.

1.2 Location. Seneca Army Depot is a US Army facility located in Seneca County, New York. SEAD occupies approximately 10,600 acres. It is bounded on the west by State Route 96A and on the east by State Route 96. The cities of Geneva and Rochester are located to the northwest (14 and 50 miles, respectively); Syracuse is 53 miles to the northeast and Ithaca is 31 miles to the south. The surrounding area is generally used for farming.

1.3 Regulatory Status. The Incinerator Ash Landfill area of Seneca Army Depot was proposed for inclusion on the Federal Facilities National Priorities List on 13 July 1989. Consequently, all work to be performed under this con-

tract shall be performed according to CERCLA guidance as put forth in the draft "Guidance for Conducting Remedial Investigations/Feasibility Studie under CERCLA", dated March 1988 (Reference 11.21).

1.4 Previous Investigations. Previous investigations have been performed at various SEAD units. An Installation Assessment and Update (USATHAMA Reports No. 157 (1980) and 157(U) (1987), respectively) were conducted by the U.S. Army Toxic and Hazardous Materials Agency. The purpose of the Assessments was to identify potentially contaminated areas at the Depot. The U.S. Army Environmental Hygiene Agency's Groundwater Contamination Survey No. 38-26-0868-88, "Evaluation of Solid Waste Management Units, Seneca Army Depot" identifies and describes all solid waste management units (SWMU's) at SEAD. In addition, a confirmation study has been performed and closure plans are being developed for the burning pads (SEAD-23). A complete list of previous investigations is presented as References in Section 11.0.

1.5 Security Requirements. Compliance with SEAD security requirements is mandated. These requirements are presented in Section 9.0.

2.0 OBJECTIVE

The objective of this project is to perform a treatability study designed and implemented by the AE. After conducting the study, the AE shall evaluate the effectiveness of the treatment study and make recommendations as to additional actions to be taken for permanent remediation. All work shall be performed under the general supervision of a Professional Engineer registered in the State of New York.

3.0 DETAILED DESCRIPTION OF SERVICES

The AE shall be responsible for performance of the work described in the Tasks below.

3.1 (Task G-1) Visual Inspection and Records Review. The AE shall perform a visual inspection of the site, and review records and reports provided by the Government or available to the AE as published data. The purpose of this Task is to permit the AE's personnel responsible for immediate supervi-

sion and implemention of the contract sufficient time to familiarize themselves with basic site conditions. It is not intended that this be a "discovery" process where new information concerning the site is developed.

3.2 (Task G-2) Work Plan. The AE shall prepare and provide a Work Plan describing the specific details of work involved in designing, installing, operating, and evaluating a permeable bed treatment system. No field work, with the exception of the initial site visit, may be performed until the plan is reviewed and approved by the Contracting Officer. All work shall be performed according to the approved plan. The Work Plan shall include, as a minimum, the following sub-plans.

3.2.1 Safety, Health, and Emergency Response Plan (SHERP). See Section 5.0 for details.

3.2.2 Quality Assurance Project Plan (QAPP). See Section 6.0 for details.

3.2.3 Monitoring Well Installation Sub-Plan. The AE shall prepare and provide as part of the Work Plan, a Monitoring Well Installation Sub-Plan. This sub-plan shall describe the materials, personnel, equipment and procedures to be used during installation of the monitoring wells. See Section 7.0 for details.

3.2.4 Dewatering, Excavation, Transport, and Storage Sub-Plan. The AE shall prepare and provide as part of the Work Plan, a Dewatering, Excavation, Transport, and Storage Sub-Plan. This sub-plan shall describe the materials, personnel, equipment and procedures to be used during the various phases of the treatment trench installation.

3.2.5 Treatment System Design Sub-Plan. As part of the Work Plan, the AE shall design a permeable treatment bed for the removal of chlorinated VOC's from the groundwater at the incinerator ash landfill area. A trench shall be excavated, sealed to competent bedrock with bentonite grout and lined with a seamless or sealed-seam permeable geotextile. The trench will then be filled with activated carbon or a sand-carbon mixture, sealed at the top, and capped with clay to minimize infiltration. Naturally flowing groundwater will be intercepted by the trench, treated and released to the downgradient side. Monitoring wells, installed prior to the bed installation, will be used to

provide baseline data and to monitor the effectiveness of the treatment bed following installation. The AE shall prepare and submit a Design Sub-plan as part of the Work Plan including narrative and drawings, outlining the design specifics of each system to the Contracting Officer for review and approval prior to trench installation. The drawings shall be conceptual (single-line) type and the narrative shall follow the requirements of Section 4.1. The Design Sub-Plan shall include the following work as a minimum:

3.2.5.1 Monitoring Wells. The AE shall propose the locations, depth and specific installation of 10 monitoring wells to be placed upgradient and downgradient of the treatment trench. For estimating purposes, the AE shall assume an average well depth of 15 feet deep. General criteria for the installation of wells are presented in Section 7.0.

3.2.5.2 Dewatering and Excavation. The AE shall design a dewatering system to remove groundwater prior to excavation. In addition, the AE shall design the trench excavation. Both dewatering and excavation designs shall be proposed based on a need to minimize the amounts of contaminated groundwater and soil to be removed. Methods of bracing the excavation, as required, shall be discussed along with methods proposed for providing positive cutoff at the trench/bedrock tie-in.

3.2.5.3 Treatment Trench. The AE shall propose the location, dimensions and configuration of the treatment trench. The trench shall be 360 feet long by 2 feet wide (minimum dimensions). The trench shall be installed to a depth of one (1) foot below competent bedrock. For estimating purposes, the AE shall assume an average trench depth of 15 feet deep.

3.2.5.4 Treatment "Bag". The AE shall design the treatment bag and the composition of its contents. Geotextile type, size and placement, in addition to the mixture percentages of sand/carbon and gradations required, shall be specified. All design assumptions (carbon efficiencies, etc.) shall be presented.

3.2.5.5 Trench Cap. The AE shall design a trench cap for control of infiltration during operation.

3.2.5.6 Storage of Excavated Material. The AE shall propose the design of temporary storage facilities for excavated soil, dewatered groundwater, well drill cuttings, and well development water. Actual treatment/disposal of material is not part of this delivery order. Storage facilities shall contain materials while preventing contaminant release to the surrounding surface area and atmosphere.

3.2.5.7 Contamination Control Measures. The AE shall discuss in the Design Sub-Plan measures to prevent the release of contaminants during the installation phase of the treatment system. Methods of excavation and equipment to be used shall be chosen based on the need to prevent releases of contaminated soil and groundwater to the surrounding ground area.

3.2.6 Air Monitoring Sub-Plan. The AE shall prepare and submit an Air Monitoring Sub-Plan as part of the Work Plan. The AE shall provide in the Sub-Plan a description of the equipment and procedures to be used for the monitoring of air quality during the installation phase. Air quality monitoring will be required, at a minimum, of the ambient air during the excavation phase using portable air monitoring instrumentation. This emissions monitoring shall be conducted on a real time basis using an organic vapor detection unit. The AE shall identify in the Sub-Plan specific air sampling locations and frequencies.

3.2.7 Identification of Applicable Regulatory and Permit Requirements. As part of the Work Plan, the AE shall identify all applicable local, State and Federal environmental regulations which govern the design, installation and operation of the proposed treatment system. It shall be the responsibility of the AE to obtain all permits required for the installation and operation of the treatment system.

3.3 (Task G-3) Treatment System Installation. The minimum requirements for installation of the treatment facilities are outlined in the following. All work shall be completed according to the approved Work Plans and in accordance with applicable Federal and State regulations and permitting requirements.

3.3.1 Monitoring Wells. The AE shall install monitoring wells according to the criteria presented in Section 7.0 and as designed in the approved Work Plans.

3.3.2 Excavating, Stockpiling, and Storing. The AE shall provide necessary labor and equipment and be responsible for all grubbing, excavating, dewatering, stockpiling, and storing. The AE shall utilize excavating methods and procedures that were approved in the Work Plan. The excavation locations as approved in the Work Plan shall not be deviated from by the AE. The AE shall assume that all excavated soil, dewatered groundwater, well drill cuttings, and well development water is to be considered hazardous and shall be handled accordingly. Stockpiling and storage facilities shall be sufficient to preclude movement of contaminants outside stockpile and storage areas. The AE shall containerize the dewatered groundwater and well development water in an area adjacent to the trench. The AE shall sample the excavated soil and dewatered groundwater to determine if they are in fact hazardous. If the analytical testing indicates they are hazardous, the Government will be responsible for disposal. If they are non-hazardous, the soil and groundwater will remain on site. The AE shall be responsible for compliance with all Resource Conservation and Recovery Act (RCRA) requirements for removal of hazardous wastes. The AE shall be responsible for acquiring all permits necessary for installation and operation of the trench. Methods for accomplishing the objectives shall be discussed in the Work Plans.

3.4 (Task G-4) Soil Characterization. The AE shall conduct two rounds of soil sampling for chemical analysis. Both rounds shall be taken during the excavation of the trench. Sampling locations shall be proposed in the Work Plans. The soil samples collected under this task shall be analyzed according to the requirements of Tables 1 and 2. In addition, Quality Control/Quality Assurance (QC/QA) samples shall be taken and analyzed according to the requirements of Tables 1 and 2. A total of 12 soil samples shall be analyzed. Soil sampling and analysis shall conform to the requirements of the approved Work Plan. Results of sampling and analysis shall be presented in the Engineering Report.

TABLE 1

Number of Samples to be Collected and Analyzed (Task G-4)

(Soil, Leachate and Control Samples.)

Type/Location of Samples To Be Collected and Analyzed.	Field Samples	QC/QA Samples		Total Samples Collected
		AE's QC Samples Splits	CEMRD QA Samples Splits	
Round 1	3	1	1	5
Round 2	3	1	1	5
Leachate	3	1	1	5
Totals (Basic)	9	3	3	15

* CEMRD (QA) samples shall be collected by the AE and sent to the government laboratory for analysis that will be conducted by the Government.
** 15 is the total to be collected by the AE; however, laboratory analysis shall be limited to only field and QC samples (total 12).

Field samples must include at least one "background" soil sample.

TABLE 2

Required Analyses, Approved EPA Methods and Estimated Quantities

Task G-4

Rounds	Method Description	Method	Field Samps	Number of QA/QC Samps**
One	B/N/A	8270	3	1
	Volatile Organics	8240	3	1
	Metals*	6010	3	1
	Arsenic	7060	3	1
	Selenium	7740	3	1
	Mercury	7470	3	1
Two	B/N/A	8270	3	1
	Volatile Organics	8240	3	1
Leachate	B/N/A	8270	3	1
	Volatile Organics	8240	3	1

* Metals Analysis: Method 6010 shall include Barium, cadmium, chromium, lead, antimony, copper, nickel, thallium, zinc and beryllium.

** The numbers presented are the samples to be analyzed by the AE's laboratory. QA samples as stated in Table 1 shall be collected by the AE and sent to the CEMRD laboratory for analysis.

3.5 (Task G-5) Dewatered Groundwater Characterization. The AE shall conduct two rounds of dewatered groundwater sampling for chemical analysis. Both rounds shall be taken during the excavation of the trench. The groundwater samples collected under this task shall be analyzed according to the requirements of Tables 3 and 4. In addition, Quality Control/Quality Assurance (QC/QA) samples shall be taken and analyzed according to the requirements of Tables 3 and 4. A total of 12 groundwater samples shall be analyzed. Groundwater sampling and analysis shall conform to the requirements of the approved Work Plan. Results of sampling and analysis shall be presented in the Engineering Report.

3.6 (Task G-6) Treatment System Monitoring. The AE shall monitor the effectiveness of the treatment system through periodic sampling of the wells placed upgradient and downgradient. Monitoring wells shall be sampled immediately prior to and following system installation and thereafter at four-month intervals for 1 year. Five rounds of monitoring well sampling shall be conducted as shown in Table 3. In addition, Quality Control/Quality Assurance (QC/QA) samples shall be taken and analyzed according to the requirements of Tables 3 and 4.

TABLE 3

Number of Samples to be Collected and Analyzed

(Monitoring Wells, Dewatered Groundwater, and Control Samples.)

Samples To Be Collected and Analyzed	Field Samples	QC/QA Samples				Total Samples
		Sample Blank, Rinsate	AE's QC Samples Split	CEMRD QA Samples Split	Sample Blank, Rinsate	
MONITORING WELLS:						
Round 1						
(Prior to installation)	10	1	1	1	1	14
Round 2						
(Following installation)	10	1	1	1	1	14
Round 3 (After 4 months)	10	1	1	1	1	14
Round 4 (After 8 months)	10	1	1	1	1	14
Round 5 (After 1 year)	10	1	1	1	1	14
DEWATERED GROUNDWATER:						
Round 1						
	2	1	1	1	1	6
Round 2						
	2	1	1	1	1	6
Totals	54	7	7	7	7	84

* CEMRD (QA) samples shall be collected by the AE and sent to the Government laboratory in Omaha, Nebraska for analysis that will be conducted by the Government.

** 84 is the total to be collected by the AE; however, laboratory analysis shall be limited to only field and QC samples (total 77).

TABLE 4

Required Analyses, Approved EPA Methods and Estimated Quantities

Rounds	Method Description	Method	Field Samps	# QA/QC Samps
MONITORING WELLS:				
One	B/N/A	8270	10	4
(Prior to	Volatile Organics	8240	10	4
installation)	Metals*	6010	10	4
	Arsenic	7060	10	4
	Selenium	7740	10	4
	Mercury	7470	10	4
Two	B/N/A	8270	10	4
(Following	Volatile Organics	8240	10	4
installation)				
Three	B/N/A	8270	10	4
(After 4 mo.)	Volatile Organics	8240	10	4
Four	B/N/A	8270	10	4
(After 8 mo.)	Volatile Organics	8240	10	4
Five	B/N/A	8270	10	4
(After 12 mo.)	Volatile Organics	8240	10	4
DEWATERED GROUNDWATER:				
One	B/N/A	8270	4	2
	Volatile Organics	8240	4	2
	Metals*	6010	4	2
	Arsenic	7060	4	2
	Selenium	7740	4	2
	Mercury	7470	4	2
Two	B/N/A	8270	4	2
	Volatile Organics	8240	4	2

* Metals Analysis: Method 6010 shall include Barium, cadmium, chromium, lead, antimony, copper, nickel, thallium, zinc and beryllium.

3.7 (Task G-7) Tri-annual Reports. The AE shall prepare tri-annual reports fully documenting the results of sampling accomplished in Task G-6. These reports shall be submitted within 14 days of completion of the testing. Specifically, each report shall present the following information:

o A summary of all analytical results that have become available during the previous four months.

o Supporting QC/QA documentation.

o All groundwater level data collected during the four-month sampling event.

o Groundwater flow maps based on the most recent four-months of groundwater level data.

o Isopleth maps for the applicable contaminants.

o Well maintenance activities planned or performed.

o Summary of well installation activities performed in the last four months, including well logs, installation details, field data collected and surveyed well locations. Existing reports may be referenced,

o Any problems or planned activities.

o An evaluation of the progress of the study based on the information provided in the items above.

3.8 (Task G-8) Engineering Report. The AE shall prepare an engineering report which fully documents all work performed. The report shall present descriptions of the existing site conditions, field work performed and the results of chemical analyses. More specifically, the report shall include discussions of the following.

3.8.1 Findings/Results/Conclusions from Round 1 Monitoring Well and Dewatered Groundwater Sampling

3.8.2 Findings/Results/Conclusions from Round 2 Monitoring Well and Dewatered Groundwater Sampling

3.8.3 Findings/Results/Conclusions from Round 3 Monitoring Well Sampling

3.8.4 Findings/Results/Conclusions from Round 4 Monitoring Well Sampling

3.8.5 Findings/Results/Conclusions from Round 5 Monitoring Well Sampling

3.8.6 Findings/Results/Conclusions from Round 1 Excavated Soil Sampling

3.8.7 Findings/Results/Conclusions from Round 2 Excavated Soil Sampling

3.8.8 Detailed Evaluation of Treatment Results

3.8.9 Discussion of Problem Areas and Operational Constraints

3.8.10 Recommendations for Further Actions

3.9 (Task G-9) Presentations and Meetings.

3.9.1 Informal Presentation. The AE shall conduct two informal presentations. One will be conducted after the draft work plan and the other after the draft engineering report. A meeting will follow each informal presentation. Presentations will be conducted at SEAD. Comments generated as a result of Government review and comments at the informal presentations shall be incorporated into the submittals by the AE. The AE shall assume that the two informal presentation/meeting will last one day each, and that two AE personnel will attend (one project manager and one technical person).

3.9.2 Formal Presentation. After the final submittal, the AE shall conduct a formal presentation of the Engineering Report and the conclusions that were reached. The formal presentation will follow a meeting in which only Government personnel and the AE will be involved. This meeting will occur in the morning session and the formal presentation in the afternoon. The AE shall assume that both the informal meeting and the formal presentation will be conducted at SEAD. During the formal presentation, the AE shall utilize handouts, vugraphs, charts and maps, as required, to illustrate the conclusions of the Engineering report. The proposed audience consists of the SEAD Commander and other installation representatives, Government personnel involved with the decision process, and regulatory agencies. All comments made shall be addressed and incorporated into the Engineering Report by the AE. The AE may assume that the meeting/formal presentation will last one day, and that one technical person and one project manager shall attend.

4.0 SUBMITTALS AND PRESENTATIONS

4.1 Format and Content of Engineering and Design Reports. The Engineering and Design Reports presenting all data, analyses, and recommendations shall be prepared in the AE's standard format for engineering and design reports. All drawings shall be of engineering quality in drafted form with sufficient detail to show interrelations of major features on the installation site map. When drawings are required, data may be combined to reduce the number of drawings. The report shall consist of 8-1/2" x 11" pages with drawings folded, if necessary, to this size. A decimal paragraphing system shall be used. The report covers shall consist of vinyl three-ring binders and shall hold pages firmly while allowing easy removal, addition, or replacement of pages. A report title page shall identify the AE, the Corps of Engineers, Huntsville Division, and the date. The AE identification shall not dominate the title page. This Statement of Work shall be incorporated in the draft report only. Submittals shall include incorporation of all previous review comments accepted by the AE as well as a section describing the disposition of each comment. Disposition of comments submitted with the final report shall be separate from the report document. All final submittals shall be sealed by the registered Professional Engineer-In-Charge.

4.2 Conference Notes. The AE will be responsible for taking notes and preparing the reports of all conferences, presentations, and review meetings. Conference notes will be prepared in typed form and the original furnished to the Contracting Officer (within five (5) working days after date of conference) for concurrence and distribution to all attendees. This report shall include the following items as a minimum:

a. The date and place the conference was held with a list of attendees. The roster of attendees shall include name, organization, and telephone number.

b. Written comments presented by attendees shall be attached to each report with the conference action noted. Conference action as determined by the Government's Project Manager shall be "A" for an approved comment, "D" for a disapproved comment, "W" for a comment that has been withdrawn, and "E" for a comment that has an exception noted.

c. Comments made during the conference and decisions affecting criteria changes, must be recorded in the basic conference notes. Any augmentation of written comments should be documented by the conference notes.

4.3 Confirmation Notices. The AE will be required to provide a record of all discussions, verbal directions, telephone conversations, etc., participated in by the AE and/or representatives on matters relative to this contract and the work. These records, entitled "Confirmation Notices", will be numbered sequentially and shall fully identify participating personnel, subject discussed, and any conclusions reached. The AE shall forward to the Contracting Officer as soon as possible (not more than five (5) work days), a reproducible copy of said confirmation notices. Distribution of said confirmation notices will be made by the Government.

4.4 Progress Reports and Charts. The AE shall submit progress reports to the Contracting Officer with each request for payment. The progress reports shall indicate work performed, and problems incurred during the payment period. Upon award of contract, the AE shall, within 15 days, prepare a progress chart to show the proposed schedule for completion of the project. The progress chart shall be prepared in reproducible form and submitted for approval. The actual progress shall be updated and submitted by the 15th of each month and may be included with the request for payment.

4.5 Completion Dates.

Site Visit/Record Review	13 Oct 89
Draft Work Plans	28 Nov 89
Informal Meeting/Presentation at SEAD	5 Dec 89
Draft-Final Work Plans	19 Dec 89
Gov't Comments Provided	8 Jan 90
Final Work Plans	22 Jan 90
Completion of Monitoring Well Installation	9 Feb 90
Completion of Trench Installation	23 Feb 90
Draft Engineering Report	7 May 91
Informal Meeting/Presentation at SEAD	22 May 91
Final Engineering Report	21 Jun 91
Formal Meeting/Presentation at SEAD	9 Jul 91

The overall completion date for this delivery order shall be 1 Aug 1991.

4.6 Submittals.

4.6.1 General Submittal Requirements.

4.6.1.1 Distribution. The AE is responsible for reproduction and distribution of all documents. The AE shall furnish copies of submittals to each addressee listed in paragraph 4.6.3 in the quantities listed in the document submittal list. Submittals are due at each of the addressees not later than the close of business on the dates shown in paragraph 4.5.

4.6.1.2 Partial Submittals. Partial submittals will not be accepted unless prior approval is given.

4.6.1.3 Cover Letters. A cover letter shall accompany each document and indicate the project, project phase, the date comments are due, to whom comments are submitted, the date and location of the review conference, etc., as appropriate. (Note that, depending on the recipient, not all letters will contain the same information.) The contents of the cover letters should be coordinated with CEHND-ED-PM prior to the submittal date. The cover letter shall not be bound into the document.

4.6.1.4 Supporting Data and Calculations. The tabulation of criteria, data, circulations, and etc., which are performed but not included in detail in the report shall be assembled as appendices. Criteria information provided by CEHND need not be reiterated, although it should be referenced as appropriate. Persons performing and checking calculations are required to put their full names on the first sheet of all supporting calculations, and etc., and initial the following sheets. These may not be the same individual. Each sheet should be dated. A copy of the final scope of services shall be included as appendix A in the report.

4.6.1.5 Reproducibles. One camera-ready, unbound copy of each submittal shall be provided to the Contracting Officer in addition to the submittals required in the document and submittal list. All final submittals shall also be provided to the Contracting Officer on floppy disks compatible with the Intel 310/80286 computer with XENIX release 3.0 update 2 operating system in ASCII format and Wordstar 2000 Release 2 format.

4.6.2 Specific Submittal Requirements.

a. Work Plans (Task G-2) (Draft, Draft-Final and Final).

b. Tri-Annual Reports (Task G-7).

c. Engineering Report (Task G-8) (Draft and Final).

4.6.3 Addressees.

Commander
U.S. Army Corps of Engineers
Huntsville Division
ATTN: CEHND-ED-PM (Mr. Walt Perro)
PO Box 1600
Huntsville, AL 35807-4301

Commander
U.S. Army Environmental
Hygiene Agency (USAEHA)
ATTN: HSHB-ES-G
Building 1677
Aberdeen Proving Ground, MD 21010-5422

Commander
U.S. Army Material Command (USAMC)
ATTN: AMCEN-A (Mr. Bob King)
5001 Eisenhower Ave.
Alexandria, VA 22333-0001

Commander
U.S. Army Corps of Engineers
Toxic and Hazardous Materials Agency
ATTN: CETHA-IR-D (Katherine Gibson)
Aberdeen Proving Ground, MD 21010-5401

Commander
US Army Corps of Engineers,
North Atlantic Division,
ATTN: CENAD-CO-EP
90 Church Street
New York, NY 10007-9998

Commander
U.S. Army Depot Systems
Command (DESCOM)
ATTN: AMSDS-EN-FD
(Mr. Tim Toplisek)
Chambersburg, PA 17201

Commander
US Army Corps of Engineers
Missouri River Division
ATTN: CEMRD-ED-EA (Mr. Doug Plack)
PO Box 103, Downtown Station
Omaha, NE 68101-0103

Commander
US Army Corps of Engineers
Missouri River Division
ATTN: CEMRD-ED-GL
PO Box 103, Downtown Station
Omaha, NE 68101-0103

Commander
Seneca Army Depot
ATTN: SDSSE-HE (Randy Battaglia)
Romulus, NY 14541

Commander
HQUSACE
ATTN: CEMP-RI
20 Massachusettes Ave., NW
Room 2209
Washington, D.C. 20314-1000

4.6.4 Document and Submittal List.

	Work Plans			Engr. Rpt.		Tri-Annual
	Draft	Draft-Final	Final	Draft	Final	Reports
CEHND-ED-PM	6	6	6	6	6	6
USAMC	1	1	1	1	1	1
DESCOM	2	2	2	2	2	2
CETHA-IR-D	2	2	2	2	2	2
CEMRD-ED-EA	3	3	3	3	3	3
CEMRD-EA-GL	1	1	1	1	1	1
SDSSE-HE	10	10	10	10	10	10
CENAD-CO-EP	0	0	1	1	1	1
USAEHA	7	0	7	1	1	1
CEMP-RI	1	0	1	0	1	0
TOTAL	33	25	34	27	28	27x3=81

5.0 SAFETY REQUIREMENTS.

Site activities in conjunction with this project may pose unique safety, chemical, and/or biological exposure hazards which require specialized expertise to effectively address and eliminate. The AE shall prepare and submit a Safety, Health and Emergency Response Plan (SHERP) to the Contracting Officer (CO) which shall address accident prevention, personal protection against chemical exposures, and emergency response procedures. The SHERP shall establish in detail the protocols necessary for protecting workers and on-site personnel, the public, and the environment from any hazards associated with well installation, soil borings, water sampling, and sediment sampling equipment and procedures; and from hazards associated with potential exposures from chemicals, agents, or situations suspected or known to be on the site. A Draft SHERP shall be submitted as a separately bound document to the CO for approval prior to the commencement of any on-site activity which, with revisions, will stand as the Final SHERP for this site. All work shall be performed according to the approved SHERP. The SHERP shall be prepared in accordance with the requirements specified in this section. The SHERP must be prepared and administered by a Certified Industrial Hygienist (CIH).

Qualifications for the CIH shall consist of training and experience commensurate with the hazards to be encountered for the project. The SHERP shall comply with all federal, state, and local health and safety requirements, e.g., the Occupational safety and Health Administration (OSHA) requirements (29 CFR 1910 and 1926), the U.S. Environmental Protection Agency (USEPA) hazardous waste requirements (40 CFR 260-270), the U.S. Army Corps of Engineers Safety and Health Requirements Manual (EM 385-1-1), and the U.S. Army Materiel Command Safety Manual, AMC-R 385-100. The SHERP shall include but not limited to:

5.1 Organization/Administration. The AE shall assign responsibilities for safety activities and procedures. A Certified Safety Professional (CSP) shall be designated to implement the SHERP for all onsite activities. A person certified in first aid/CPR by the Red Cross or equivalent, shall be continuously present on-site during operations.

5.2 Standard Operating Procedures (SOPs). The AE shall outline standard operating procedures (SOPs) for preventing accidents, and protecting personnel from injury and occupational illness for all operations having a significant accident potential. Approved SOPs will be made available to prime and subcontractor personnel for personnel information guidance and compliance.

5.3 Identification of Hazards. The AE shall review existing records and data to identify potential hazards associated with the designated drilling and sampling sites and to evaluate their impact on field operations. The AE shall develop action levels for controlling worker exposure to the identified hazards in accordance with appropriate requirements.

5.4 Personal Protective Equipment. The AE shall provide appropriate personal protective equipment (PPE) to ensure workers, official visitors and government employees are protected from exposure to recognized physical hazards and protected from exposure to hazardous chemical concentrations above the action level (Levels A, B, C, D, and modifications) for each operation stated for each work zone. The level of protection shall be specified in the SOP for each operation. The AE shall provide and maintain all PPE.

5.5 Safety and Health Training. The AE shall, as a minimum provide training to his employees complying with the requirements of 29 CFR 1910.120. The program shall inform employees, official visitors and government employees of the special hazards and procedures (including PPE, its use and inspection) to control these hazards during field operations. Employees shall be trained in emergency procedures, areas of restricted access, methods of decontamination, and general safety. All prime and subcontractor personnel shall complete this program prior to beginning on-site work. The AE shall keep individual training records on all workers associated with the project and submit a copy of these records in the draft SOP.

5.6 Monitoring. The AE shall provide continuous monitoring of the identified hazards associated with the designated drilling sites for controlling worker exposure during field operation. When applicable, National Institute for Occupational Safety and Health (NIOSH) approved sampling and analytical methods must be used.

5.7 Emergency Procedures. The AE shall establish procedures to take emergency action in the event of immediate hazards, i.e.,a chemical agent leak or spill, fire, or personal injury. The AE designated CSP shall serve as the emergency coordinator. Personnel and facilities providing support in emergency procedures shall be identified. Specify the emergency equipment to be present on-site and the Emergency Response Plan procedures, as required by 29 CFR 1910.120 (1) (1) (ii).

5.8 Medical Surveillance. Prime and subcontractor personnel shall have medical examinations prior to commencement of work. The medical examination results shall be evaluated by a board-certified or board-eligible licensed physician practicing occupational medicine to determine if the individual is physically fit for the work to be performed and that no physical condition or disease would be aggravated by exposure to the identified hazards. Medical records shall be available for review by the CO upon request. Specify exam content and frequency.

5.9 First Aid. The AE shall provide appropriate emergency first aid equipment suitable for treatment of exposure to identified hazards, including chemical agents. A vehicle shall be made available to transport injured workers to medical facilities identified in the SHERP.

5.10 Accident Prevention, Recording and Recordkeeping. An accident prevention plan and description of work phase safety plans shall be addressed, as discussed in Paragraphs 01.A.03 thru 01.A.06 and Appendix Y of COE EM 385-1-1 for those topics not specifically addressed by this listing. The AE shall immediately notify the CO of any accident/incident. Within two working days of any reportable accident the AE shall complete and submit to the CO an Accident Report on ENG Form 3394 in accordance with AR 385-40 and OCE supplement 1 to that regulation.

5.11 Safety Inspection. The AE shall conduct regular safety inspections to determine if operations are being conducted in accordance with established SOPs.

5.12 Site Layout and Control. Include a site map, work zone delineation, on/off-site communications, site access controls, and security (physical and procedural). The AE will determine three areas; exclusion, contamination reduction and support, for each work site. No person shall be allowed entry into the exclusion and contamination reduction areas unless in compliance with Sections 5.4, 5.5, and 5.8.

5.13 Air Monitoring Program. Specify the types and frequency of air monitoring/sampling to be performed. Include real-time (direct-reading) monitoring and integrated (TWA) sampling for specific contaminants of concer, as appropriate. Discuss instrumentation and calibration to be performed.

5.14 Health and Safety Work Precautions. Buddy system, eating and drinking precautions, smoking and ignition sources, potentially hazardous noise, explosive atmosphere, illumination, heat or cold stress, confined space entry precautions, eye wash stations, fire extinguishers, sanitation, and routine safety inspections shall be discussed.

5.15 Personnel and Equipment Decontamination. Specify decon facilities and procedures for personnel protective equipment, sampling equipment, and heavy equipment.

5.16 Logs, Reports, and Recordkeeping. Safety inspection reports, accident/incident reports, medical certifications, training logs, monitoring results, etc. All exposure and medical monitoring records to be maintained according to OSHA standard 29 CFR 1910.20.

5.17 Unexploded Ordnance. The facility is a military installation and has been used for storage, evaluation and disposal of ordnance and/or explosive materials as well as for military training. If explosive contamination or unexploded ordnance is discovered at any time during operations at the site the AE shall mark the location, immediately stop operations in the affected area, and notify the CO. The Government will make appropriate arrangements for evaluation and proper disposal of the device. It is anticipated that in the unlikely event that such conditions arise, they will be overcome with only slight delays to the AE. It is the express intention of the Government that the AE is not to drill, excavate, or otherwise disturb the subsurface in areas where ordnance or explosives may reasonably be suspected unless specific, detailed plans to do so are prepared and approved.

5.18 Suggested SHERP Format.

STAFF ORGANIZATION
- Principal Engineer
- Program Manager
- Certified Industrial Hygienist
- Certified Safety Professional
- First Aid/CPR Personnel
- Field Personnel
- Subcontractor Personnel

HAZARD COMMUNICATION AND TRAINING
- Comprehensive Health and Safety Indoctrination
- Specialized Training
- Visitor Training
- Pre-Investigation Health and Safety Briefing
- Post-Investigation Health and Safety Briefing
- Morning Safety Meetings

MEDICAL SURVEILLANCE
- Medical Surveillance
- Licensed Occupational Physician
- Medical Examinations

EXPOSURE MONITORING
- Environmental and Personnel Monitoring
- Meteorological Monitoring
- Sampling and Analytical Methods
- Heat/Cold Stress Monitoring

HEALTH AND SAFETY EQUIPMENT
- Personal Protective Equipment
- Environmental Monitoring Equipment
- Decontamination Equipment
- Emergency Equipment
- Emergency-Use Respirators
- Spill Control Equipment
- Fire Extinguishers
- First Aid Equipment and Supplies
- Emergency Eye Wash/Shower (ANSI Z358.1)
- Personnel Hygiene
- Personnel Decontamination
- Communications

STANDARD OPERATING PROCEDURES
- Hea h and Safety Site Plan
- Site Description
- Site Inspection
- Site Security
- Site Entry Procedures
- Responsibilities
- Work Zones
- Hazard Evaluation
- Activity Hazard Analysis
- Accident Prevention
- Accident Reporting
- Safe Work Practices
- Confined Space Entry Procedures
- Material Handling Procedures
- Levels of Protection
- Decontamination Procedures
- Emergency Information
- Emergency Response Plan
- Illumination
- Sanitation
- Well Installation/Logging
- Sampling
- Land Survey
- Laboratory Analysis
- Logs, Reports, and Recordkeeping

6.0 QUALITY ASSURANCE PROJECT PLAN REQUIREMENTS

The AE shall prepare and submit the Quality Assurance Project Plan (QAPP) according to the requirements of this section, ER 1110-1-263, and the definitions given in Paragraph 6.9. The site specific field and laboratory QC/QA plan shall be included. The AE shall propose only methods and procedures in the work plans acceptable to EPA and the State of New York.

6.1 Approval. The work plan must be approved by the CO prior to performing any field work. In the event corrections or comments are made by the CO on the draft work plan, any necessary changes shall be implemented by the AE before final approval.

6.2 AE Responsibility for Chemical Analyses. It is the responsibility of the AE to properly collect, transport, analyze and present the data pertaining to chemical analysis. If the AE or his subcontractor does not follow the specified criteria and approved work plans and thereby jeopardizes the samples, the Contracting Officer will disapprove the samples and direct the AE to resample, analyze, and present the data at no additional cost to the Government. If directed to do so by the Contracting Officer, the AE shall collect and send representative "split" samples to the US Army Corps of Engineers, Missouri River Division Laboratory (CEMRD-ED-GC, 402-221-7324). The AE will not be responsible for the analysis of the "split" samples or subsequent reporting results. The AE, however, is required to defend his results if there is disagreement between the samples analyzed by the AE and the samples analyzed by the CEMRD laboratory.

6.3 Content and Format. The plan shall address each of the topics in Paragraphs 6.4 through 6.8.2. The following outline shall be used as applicable.

SECTION 1.0 PROJECT ORGANIZATION AND RESPONSIBILITY

SECTION 2.0 SAMPLING

- 2.1 Selection of Sampling Locations
- 2.2 Samples to be Collected
  - 2.1.1 Soil/Leachate Samples
  - 2.1.2 Groundwater Samples
  - 2.1.3 QC/QA Samples

2.3 Sample Collection Methods and Equipment

2.4 Sample Containers

2.5 Sample Preservation

2.6 Identification

2.7 Transportation and Custody

SECTION 3.0 ANALYSES

3.1 Parameters

3.2 Analytical Methods and Detection Limits

3.3 Laboratory QC/QA

SECTION 4.0 DATA ANALYSIS AND REPORTING

SECTION 5.0 PROGRAM CONTROLS

SECTION 6.0 AIR MONITORING

6.4 Project Organization and Responsibility. The project organization for the prime contractor and any subcontractors shall be clearly defined with a discussion of quality control responsibilities. The AE's Quality Control (QC) Officer shall report to a responsible senior officer of the company, that is, QC management shall be separate from project management. A list of key individuals shall be provided, including those with QC responsibilities. The project-related qualifications of the AE's analytical laboratory shall be addressed in terms of equipment, facilities, and personnel. Names of laboratory supervisors, chemists, technicians and QC officers shall be given with brief resumes chronologically listing education and experience. The project schedule and list of responsible persons shall be stated.

6.5 Sampling. Unless otherwise specified in this SOW and contract, all sampling and sample custody procedures shall be consistent with EPA and State of New York guidelines.

6.5.1 Selection of Sampling Locations. For sampling sites to be chosen in the field, the plan shall describe the rationale that will govern their selection. The plan shall provide the location of each known sampling point on a site map. The plan shall discuss geological and hydrological influences on sample location, and provisions to insure that samples are representative of the site through the use of appropriate field control samples.

6.5.2 Samples to be Collected. The plan shall list or tabulate the samples to be collected, showing the number of samples, locations and analytes. The list shall include field controls. Samples collected and prepared in the field shall include: soil samples, groundwater samples, and field control samples.

6.5.2.1 Soil Samples. The plan shall list or tabulate samples to be collected from the soil borings and test pits for chemical analysis, indicating number, location, depth and analyses required.

6.5.2.2 Groundwater Samples. Each of the groundwater monitoring wells shall be sampled once, by the procedure specified in Paragraph 6.5.3.2. All sampling of wells installed under this delivery order shall be accomplished within a period not exceeding five consecutive days. All samples to be analyzed for metals shall be filtered at the time of collection through filter membranes with a nominal pore size of 0.45 microns.

6.5.2.3 Field Control Samples. A minimum of 10% of all groundwater samples collected shall be QC/QA (5% QC, 5% QA). At least two sampling blanks (1 QC, 1 QA) and two duplicates (1 QC, 1 QA) shall be collected. If samples are to be tested for volatiles, at least two travel blanks shall be included (1 QC, 1 QA).

6.5.2.4 Summary. The types and numbers of samples required are summarized in "Number of Samples to be Collected and Analyized", Tables 1 and 3.

6.5.3 Sample Collection Methods and Equipment. The plan shall include specific sampling procedures and equipment to be used to collect the various samples. Appropriate references or descriptions shall be given as needed including sample sizes, containers, equipment, etc. Collection and preservation methods shall be consistent with the specified analytical methods and other standards.

6.5.3.1 Prevention of Cross-Contamination. The plan will describe cleaning of equipment and precautions for preventing contamination of samples during collection.

6.5.3.2 Groundwater Sampling. Before a sample is collected from a well, the depth to water from the surveyed reference point shall be measured and recorded. Then the well shall be pumped or bailed with clean equipment to

remove a quantity of water equal to at least five times the submerged volume of the casing. If the well does not recharge fast enough to permit removing five casing volumes, the well shall be pumped or bailed dry, and allowed to recharge for four hours. If the well has recharged to greater than 50 percent of the static water level, then two to three well volumes shall be removed. If the well does not recover to 50 percent of the static water level in four hours, then the well shall be pumped dry a second time and sampled as soon as sufficient recharge has occurred. The sample taken from the well for chemical analyses shall be collected from the screened portion of the well and not from the overlying riser section or the underlying sand-sump section of the well. The plan shall describe details of the sample collection procedure.

6.5.3.3 Collection of Soil Samples. The plan shall include complete details of the proposed procedure for collecting soil samples.

6.5.4 Sample Containers. List the composition and volume of containers to be used according to sample type and analyte. Describe cleaning and other preparation of containers.

6.5.5 Sample Preservation. List or tabulate the required preservation methods and maximum holding times, by sample type and analyte.

6.5.6 Identification. Describe the proposed system for identifying, labeling and tracking samples. Include recording of field data in permanently bound notebooks, and the system for relating field data to the proper samples.

6.5.7 Transportation and Custody. Describe packing, shipping or other transportation and custody documentation, in accordance with "Sample Handling Procedures," HND Guideline, September, 1986.

6.6 Analyses.

6.6.1 Parameters. The plan shall tabulate the samples to be collected, each analyte to be investigated, analyses to be performed, and associated predicted detection limit for each analyte. Analysis as listed in the SOW shall be performed on each field sample as well as on field controls sent to the AE's laboratory or subcontract laboratory. Laboratory controls (internal QC

samples) are not listed, but shall be included in the approved QAPP. Alternate methods and variation in procedures to those in this SOW may be used if approved by the CO and described in the approved plan.

6.6.2 Analytical Methods. Each proposed method must be specified exactly and in detail by one of the following: (1) Reference to an accepted published method, e.g., an EPA, SM, or ASTM method, if the published procedure is followed exactly, or (2) reference to an accepted published method with a description of any deviations from the published procedure, or (3) complete description of the procedure, e.g., copies of laboratory instructions. Descriptions of any pre-treatment or preparation of the sample required before the actual analysis shall be included. Include the required concentration ranges, and data on the sensitivity (detection limits), precision and accuracy, by analyte and sample matrix in the descriptions of methods. Detection limits shall correspond to the Contract Laboratory Program of the USEPA. Indicate how pre-existing data on sensitivity, precision and accuracy were determined, and procedures to be used to validate the methods for the matrices in question.

6.7 Data Analysis and Reporting. For each analytical method and major measurement parameter, the following information shall be provided:

6.7.1. The data analysis scheme including units and equations required to calculate concentrations or the value of the measured parameter.

6.7.2. Plans for treating results that appear unusual or questionable. Describe the feedback systems used to identify problems by means of the results obtained from control samples. Limits of data acceptability shall be included with the corrective action to be taken when these limits are exceeded. Personnel responsible for initiating and carrying out corrective action shall be indicated. Describe how re-establishment of control is demonstrated. Unacceptable contamination levels in blanks, and the maximum acceptable disagreement between replicate samples and analyses shall be stated in the QAPP. These limits shall correspond to those required by the Contract Laboratory Program of the USEPA. Corrective action to be taken when these

limits are exceeded shall be described, and the circumstances that require collection of new samples at no additional cost to the Government shall be specified.

6.7.3. Description of the data management systems, including the collection of raw data, data storage and data quality assurance documentation.

6.7.4. Identification of individuals to be involved in the reporting sequence.

6.7.5. Description or illustration of the proposed data reporting format. Only quantified concentrations of analytes shall be reported.

6.7.6. Procedures to assess the precision, accuracy and completeness of all measurement parameters. The AE shall report precision based on standards and known additions. If statistical procedures are used for data review before reporting, include descriptions.

6.8 Program Controls

6.8.1 Calibration Procedures and Frequency. List field and laboratory instrumentation, specifying manufacturers, models, accessories, etc., with procedures used for calibration and frequency of checks. The instrumentation and calibration should be consistent with the requirements of the contract and the analytical method requirements.

6.8.2 Internal Quality Control Checks. Internal quality control checks are necessary to evaluate performance reliability for each measurement parameter. The numbers and types of internal QC checks and samples proposed (e.g. blanks, duplicates, splits, "spiked" samples and reference standards, as applicable) shall be defined clearly in the work plan and summarized by methods and analytes. The laboratory's established practice for including control samples among the samples tested, and any additional controls required by the present project, shall be described.

6.8.3 Preventive Maintenance. A system for preventive maintenance for facilities and instrumentation shall be described. Preventive maintenance shall be performed by qualified personnel. Records shall be maintained and shall be available for inspection by the CO on request and subsequent repairs, adjustments and calibrations shall be recorded.

6.8.4 External Certification. Prior to any sampling activities under this SOW, the AE's analytical laboratory must be validated by the US Army Corps of Engineers, Missouri River Division (CEMRD-ED-GC, 402-221-7324) or its representative for the contaminants of concern. It is the responsibility of the AE's laboratory to achieve validation from CEMRD independent of CEHND and this delivery order. The AE should start the validation process as soon as this delivery order is awarded since the process takes approximately six (6) to eight (8) weeks.

6.8.5 Laboratory QC. Laboratory QC results shall be submitted to the QA laboratory as soon as it becomes available.

6.9 Definitions. The following terms and meanings are given as they are applied here, since usage and terminology in this field are not yet standardized.

6.9.1 Field Blank Sample is a trip blank, rinsate sample, field background soil blank sample submitted with the field samples for QC/QA purposes.

6.9.2 Field Control Samples are field splits, duplicates/replicates and Field Blank Samples submitted with the field samples for QC/QA purposes.

6.9.3 Trip or Travel Blanks are Type II Reagent Grade organic-free deionized water in 2 x 40 mL VOA vials that accompany the sample containers to the field and back to the laboratory. Trip blanks are used only for coolers containing aqueous samples for volatile organic analysis. These blanks, as well as all other samples being submitted for volatile organic analysis, are to contain no headspace.

6.9.4 Rinsate Blanks are collected rinse water (Type II Reagent Grade) from the final rinses of the sampling equipment. Rinsate blanks are to be used in conjunction with volatile, semi-volatile and in-organic analysis of water samples. Sample preservation and containers shall be appropriate for the analytes of interest.

6.9.5 Laboratory Blank. A sample prepared at the laboratory from pure materials containing none of the analyte. Laboratory blanks include method blanks, reagent blanks and others.

6.9.6 Splits are two or more subsamples of one large sample. These are taken after compositing a large soil sample (after samples for volatile analyses have been removed). Splits are used for both QA and QC purposes for soil samples for all analytes excluding volatiles. It is acceptable to split soil samples into three portions after compositing (field sample, split for QA, and split for QC).

6.9.7 Duplicates or Triplicates are separate samples collected at the same location and time as the original sample. Duplicates or triplicates are preferred over splits for volatile organic analyses of soil samples because compositing leads to loss of volatile components. Water samples for QA/QC checking are also duplicate or triplicate samples.

6.9.8 Check/Calibration Standards are used to calibrate field instruments such as the VOA meter and are used to establish control limits for analytical parameters.

6.9.9 Quality Assurance Samples are collected by the sampling team for use by the government's QA laboratory. The purpose of the sample in to assure the government that the data generated by the AE's analytical laboratory are of suitable quality.

6.9.10 Quality Control Samples are collected by the sampling team for use by the AE's laboratory. The identity of these samples is held blind to the analysts and laboratory personnel until data are in deliverable form. The purpose of the sample is to provide site specific field originated checks that the data generated by the AE's analytical laboratory are of suitable quality.

6.9.11 Internal QC Sample or Laboratory Control. A reference standard, standard addition, replicate sample, blank or other sample are samples in which the analyte concentration is known or can be calculated, which is placed among the samples to be analyzed in order to evaluate or demonstrate validity of the analytical results.

6.9.12 Reference Standard. A sample prepared from pure reagents to contain one or more analytes at known concentrations.

6.9.13 Standard Addition or "Spiked" Sample. A field sample to which known concentrations of one or more analytes have been added.

6.9.14 Laboratory Replicate Samples. Subsamples of a single field sample which are divided at the laboratory and analyzed as separate samples.

6.9.15 Replicate Analyses. Multiple analyses performed on the same sample.

6.9.16 Laboratory Blank. A sample prepared at the laboratory from pure materials containing none of the analyte. Laboratory blanks include method blanks, reagent blanks and others.

6.9.17 Soil Blanks (Background) are used to establish background levels of metals and other analytes in soils. These are normally collected from visually clean soil near the site. The field background soil blank sample is usually counted along with the field samples. It is collected in duplicate and submitted to the AE's laboratory and the QA laboratory along with the field samples.

6.10 Site Specific Sampling and Analyses Requirements. The following specific requirements shall be addressed in the appropriate sections of the QAPP and followed in the sampling and analysis activities.

6.10.1 Groundwater Samples. Representative groundwater samples shall be collected and analyzed from the six rounds identified in the SOW. The AE shall select sampling points that will reflect the effectiveness of the trench in treating the plume. Representative groundwater samples shall be obtained using techniques and equipment as described in the QAPP. The various procedures shall insure that samples are handled properly, equipment is clean, and sample integrity is maintained. The sampling device shall not bias sample parameter concentrations. The sample volume must be sufficient for the analyses required.

6.10.1.1 Field Control Samples, Groundwater. For each sampling period, sufficient groundwater shall be collected for three samples to form a field split. The soil shall be collected then divided among sample containers and properly preserved. Two of the three samples shall be separately identified and sent to the AE's laboratory: one as a field sample, the second as a QC sample and the third is to be sent to CEMRD for government analysis. The required number of field splits are indicated in Table 1. A rinsate sample

from sampling equipment, shall also be collected. This rinsate sample shall be split, with one portion going to the AE's lab and the other going to the CEMRD lab.

6.10.2 Organic Vapor Detection (OVD) Unit. The AE shall provide an OVD capable of monitoring the trench construction emissions. The OVD shall be available for all testing operations at the trench. The AE shall describe quality control procedures, equipment utilized and operating personnel. The AE shall discuss the analytes (in relation to the site) that the OVD unit will detect and detection limits. The sampling locations and frequencies shall be identified in the Work Plan.

6.10.3 Sample Containment, Preservation, and Holding Times. The AE shall provide information on sample containment preservation and maximum holding times for groundwater samples. When arranging the schedule for sample collection, the AE shall coordinate with the laboratory to assure that samples arrive and are analyzed within the maximum holding times specified by applicable EPA regulations and method guidelines. The AE shall be responsible for the coordination with CEMRD and for the collection and transportation of the stated number of QA samples to the government laboratory for analyses that will be conducted by the Government.

6.11 Reporting. Chemical results shall be included in the Engineering Report. Compounds identified in the samples shall be listed or tabulated, with the best estimates of concentrations that can be made from the methods and techniques employed. Concentrations reported shall be accompanied by confidence limits or other comparable indications of the associated uncertainty. The concentrations of contaminants encountered shall be compared to appropriate state or federal concentration limits for such contaminants. Data from field quality control samples and from relevant laboratory quality control samples shall also be included. The AE shall attach raw data and reports generated by field and laboratory operations to the Engineering Report as appendices.

7.0 MONITORING WELL REQUIREMENTS.

The following requirements shall be incorporated into the AE's Monitoring Well Installation Sub-Plan and followed in the field. The plan shall be prepared using the following outline as applicable:

SECTION 1.0 INTRODUCTION AND BACKGROUND

SECTION 2.0 WELL LOCATIONS AND DEPTHS

SECTION 3.0 DRILLING EQUIPMENT

SECTION 4.0 DRILLING PROCEDURES

SECTION 5.0 CONTAMINATION PREVENTION AND DECONTAMINATION PROCEDURES

SECTION 6.0 WELL DESIGN AND INSTALLATION

SECTION 7.0 WELL DEVELOPMENT

SECTION 8.0 IN-SITU PERMEABILITY

SECTION 9.0 PROJECT ASSIGNMENTS & PERSONNEL QUALIFICATIONS

7.1. Location. Monitoring well locations shall be proposed by the AE as part of the sub-plan prior to commencement of drilling activities. The AE shall obtain written approval from the facility engineer to drill at each site to avoid disturbing buried utilities.

7.2. Design of Monitoring Wells. The design and installation of all monitoring wells shall follow as closely as practical the design for properly installed, low-yield domestic water supply wells. Recommended practices for such wells are set out in "Manual of Water Well Construction Practices", U.S. EPA Publ. EPA 570/9-75-001 (Reference 11.2). Additional design recommendations are given in "Procedures Manual for Groundwater Monitoring at Solid Waste Disposal Facilities", USEPA Publ. No. EPA 530/SW-611 (Reference 11.1). State and local certification requirements for drillers shall be met. State and local design and installation requirements shall be met. The AE shall be responsible for obtaining any soil boring or well drilling permits required by state or local authorities and for complying with state or local regulations concerning submission of well logs and samples.

7.3. Installation of Monitoring Wells.

7.3.1 General Requirements. The AE shall provide all drilling equipment, materials and personnel required to install the wells, as well as a qualified geologist or geotechnical engineer who shall be on-site for all

drilling, installation, development and testing operations. The AE shall submit proposed drilling methods in the System Design, Installation and Monitoring Sub-Plan. Any changes to the approved drilling methods must be submitted to the Contracting Officer for prior approval.

7.3.2. Protection of Water Yielding Zones. The use of any liquid, including water, is to be avoided during drilling and will only be permitted by the Contracting Officer in cases where he determines that it is absolutely necessary for successful installation of the well. If water is required during drilling or well installation, only non-chlorinated potable water will be permitted. Any proposed use and source of water must be approved by the Contracting Officer beforehand. Grease or oil on drill rod joints will not be permitted. Dispersing agents (such as phosphates) or acids shall not be used. There shall be no attempt made to chemically disinfect the well. The rigs, drill tools, and associated equipment shall be cleaned with steam and washed and rinsed with a decontaminating liquid prior to commencement of drilling at each well. It is expressly required that toxic and/or contaminating substances shall not be used during any part of the drilling, well installation or well development processes. All drilling activities and methods shall be sufficient to positively prohibit the introduction of contaminants from one water bearing stratum to another via the well bore or completed well.

7.3.3 Well Design.

7.3.3.1 Boring Diameter. The boring shall be of sufficient diameter to permit at least two (2) inches of annular space between the boring wall and all sides of the centered riser and screen.

7.3.3.2 Well Riser and Screen.

7.3.3.2.1 Riser. Well riser shall consist of new threaded, flush joint, Stainless Steel pipe with a nominal diameter of two (2) inches. Well risers shall, as a minimum, conform to the requirements of ASTM D-1785 Schedule 40 pipe and shall is clearly identified as the material which is specified.

7.3.3.2.2 Screen. The well screen shall be five (5) feet in length and shall be constructed of material similar to the well riser. The screen shall be noncontaminating, factory constructed and of "continuous wrap"

or "mill-slot" design. Field slotted or cut screen is not permitted. The slot size shall be determined by the AE and designed to be compatible with aquifer and filter pack material. The AE shall provide a sieve analysis of one or more representative samples of the aquifer material in which the screen is placed and which demonstrates that the screen is compatible with the aquifer material. The sieve analysis shall be conducted in accordance with ASTM C-117 and C-136 and results shall be submitted to the Contracting Officer with the field boring logs.

7.3.3.2.3 Screen Location. The AE shall have the responsibility of placing the well screen in the appropriate location in the bore hole so that the completed monitoring well functions satisfactorily.

7.3.3.2.4 Sand-Sump. There shall be a 1-foot "sand-sump" placed below the base of the screen. The sand-sump shall be a blank section of riser conforming to the requirements of riser as described above. The sand-sump will be installed only if the screen can be placed at the appropriate interval without the sand-sump penetrating any underlying aquitards.

7.3.3.2.5 Joining Screen and Riser. Screen and riser sections shall be joined by threaded, flush-joint couplings, to form watertight unions, that retain 100% of the strength of the screen. Solvent glue shall not be used at any time in installation of the wells. The bottom of the deepest screen or casing section shall be sealed with a threaded cap or plug of inert, non-corroding material similar in composition to the screen itself.

7.3.3.2.6 Well Plumbness and Alignment. All risers and screens shall be set round, plumb, and true to line. Centralizers shall be used to assure plumbness and alignment of the wells. Centralizers shall not be installed on the well screen.

7.3.3.3 Filter Pack. The AE shall select and use clean, inert, siliceous materials to construct a uniform and continuous filter pack designed to prevent migration of fines into the screen. Carbonate or crushed stone material shall not be used. The filter pack shall be placed by tremie pipe from the bottom of the boring to approximately two (2) feet above the top of the well screen.

7.3.3.4 Bentonite Seal and Grout. A minimum two (2) foot seal, consisting of tamped bentonite pellets or bentonite slurry shall be placed into the annular space between the riser and boring wall at the top of the filter pack. Non-shrinking cement grout shall then be placed from the top of the bentonite seal to the ground surface. The cement grout shall consist of a mixture of portland cement (ASTM C-150), and water in the proportion of not more than seven (7) gallons of clean water per bag of cement (One cubic foot or 94 pounds). Additionally, 3% by weight of bentonite powder shall be added if permitted by State regulations.

7.3.4 Soil Sampling for Geotechnical Analysis. During drilling of monitoring wells, soil samples shall be collected and geotechnical analysis shall be performed as outlined below.

7.3.4.1 Dry, hollow stem or solid auger methods of drilling shall be used wherever subsurface conditions allow.

7.3.4.2 Soil samples shall be taken continuously for the first 10 feet and at 5-foot intervals thereafter.

7.3.4.3 Sampling shall be done with a split-spoon sampler (ASTM D-1586) or thin wall sampler (ASTM D-1587) using standard sampling techniques.

7.3.4.4 Samples shall be stored in labeled, air-tight plastic or glass containers by the AE until such time as they are needed for testing or the contract is complete.

7.3.4.5 All soil samples shall be visually classified by the Unified Soil Classification System. The AE shall verify the classification by laboratory analyses consisting of the following:

Test Description	# Required/ Well
a. Grain-size distribution (ASTM-D 421 & 422)	2
b. Atterburg limits (ASTM-D 423 & 424)	2
c. Moisture content (ASTM-D 2216)	2

Specific soil samples to be tested, along with type of test, will be determined by the AE after reviewing the boring logs. Laboratory analyses shall use equipment and methods described in EM-1110-2-1906 or ASTM manuals.

7.3.5 Protection of Well. At all times during the progress of the work, precautions shall be used to prevent tampering with the well or the entrance of foreign material into it. Upon completion of the well, a suitable vented cap shall be installed to prevent material from entering the well. The well riser shall be surrounded by a larger diameter steel casing set into a concrete pad and rising 24" to 36" above ground level. The steel casing shall be provided with lock and cap. A minimum three foot square, four inch thick concrete pad, sloped away from the well shall be constructed around the well casing at the final ground level elevation. A survey marker shall be permanently placed in each pad as detailed in Section 8.0. Four, two-inch or larger diameter steel posts shall be equally spaced around the well and embedded in the concrete pad. The ground immediately surrounding the top of the well shall be sloped away from the well. There shall be no openings in the protective casing wall below its top.

7.3.6 Temporary Capping. Any well that is to be temporarily removed from service, or left incomplete due to delay in installation, shall be capped with a watertight cap and equipped with a "vandal proof" cover satisfying applicable state or local regulations or recommendations.

7.3.7 Field Logs. The field geologist or geotechnical engineer shall maintain suitable logs detailing drilling and well installation practices. One copy of each field log including the required color slides, shall be submitted to the Contracting Officer not later than 10 calendar days after each well is completed. The well will not be accepted by the Contracting Officer until the logs are received and approved. Information provided in the logs shall include but not be limited to the following:

7.3.7.1 Reference elevation for all depth measurements.

7.3.7.2 Depth of each change of stratum.

7.3.7.3 Thickness of each stratum.

7.3.7.4 Identification of the material of which each stratum is composed according to the Unified Soil Classification System, or standard rock nomenclature, as necessary.

7.3.7.5 Depth interval from which each formation sample was taken.

7.3.7.6 Depth at which hole diameter (bit sizes) change.

7.3.7.7 Depth at which groundwater is first encountered.

7.3.7.8 Depth to the static water level and changes in static water level with well depth.

7.3.7.9 Total depth of completed well.

7.3.7.10 Depth or location of any loss of drill water circulation, loss of tools or equipment.

7.3.7.11 Location of any fractures, joints, faults, cavities or weathered zones.

7.3.7.12 Depth of any grouting or sealing.

7.3.7.13 Nominal hole diameters.

7.3.7.14 Amount of cement used for grouting or sealing.

7.3.7.15 Depth and type of well casing.

7.3.7.16 Description (to include length, location, diameter, slot sizes, material, and manufacturer) of well screen(s).

7.3.7.17 Any sealing-off of water-bearing strata.

7.3.7.18 Static water level upon completion of the well and after development.

7.3.7.19 Drilling date or dates.

7.3.7.20 Installation details of monitoring well.

7.3.8 Final Logs. The field logs shall be edited and drafted for inclusion into the final report.

7.4. Well Development. After each well has been constructed, but no sooner than 48 hours after grouting is completed, the AE shall direct a program for the development of the well by pumping and/or surging, without the use of acids, dispersing agents or explosives. Development shall continue for a period of 4 hours (minimum), and until groundwater removed from the well is clear and free of sand and drilling fluids. No water or other liquid may be introduced into the well other than formation water from that well. After final development of the well, the AE shall collect approximately 1 liter of water from the well in a clear glass jar, label and photograph it with a 35mm color slide, and submit the slide as part of the well log. The photograph shall be a suitably back-lit close up which shows the clarity of the water.

7.5. In-Situ Permeabilities. After development of monitoring wells, the AE shall calculate for each, the in-situ permeability of the screened stratum in accordance with "Methods of Determining Permeability, Transmissibility and Drawdown," (Reference 11.3) or other equivalent methods. However, no water or other liquid may be introduced into the well other than formation water from that well.

7.6. AE Responsibility for Monitoring Wells.

7.6.1 It is the responsibility of the AE to properly plan, design, install, develop, and test monitoring wells so that they are suitable to produce groundwater samples representative in quantity and quality of subsurface conditions. The AE shall ensure that the requirements of this scope of work and best installation practices are carried out.

7.6.2 If the AE, due to his inadequate design or installation, installs monitoring wells that are not functional or not in accordance with specifications, the Contracting Officer will disapprove the well and direct the AE to repair or replace it at the Contacting Officer's discretion. This work shall be done at no additional cost to the Government.

7.6.3 If a monitoring well is disapproved by the Contracting Officer, or is abandoned by the AE for any reason, the hole shall be backfilled with neat cement grout from top to bottom by the AE at no additional cost to the Government.

7.7 Containerization of Purge Water. The AE shall contain all purge water in DOT approved 55 gallon drums when the storage facility is no longer available for use. The AE shall lable and manifest, according to RCRA regulations, each drum of material which is to be handled as hazardous waste. Actual disposal will be the responsibility of the Government.

8.0 SURVEY REQUIREMENTS.

8.1 Control Points. Plastic or wooden hubs shall be used for all basic control points. A minimum of three (3) concrete monuments with 3.25-inch domed brass or aluminum alloy survey markers (caps) and witness posts shall be established at the site. The concrete monuments shall be located within the project limits, be set 50 feet from the edge of any existing roads in the in-

terior of the project limits and be a minimum of 1,000 feet apart. The placement of all monuments, hubs etc., shall be coordinated with SEAD to prevent destruction due to regular landscaping activities. Horizontal control (1:10000) and vertical control (1:5000) of third order or better shall be established for the network required for all the monuments. The caps for the new monuments shall be stamped in a consecutively numbered sequence as follows:

SEAD-1-1989	SEAD-2-1989	SEAD-3-1989
USAED-HUNTSVILLE	USAED-HUNTSVILLE	USAED-HUNTSVILLE

The dies for stamping the numbers and letters into these caps shall be of 3/16-inch in size. All coordinates are to be referenced to the State Plane Coordinate System and all elevations are to be referenced to the 1929 North American Vertical Datum.

8.2 Location Surveys. A 3.25-inch diameter domed survey marker (cap) composed of brass, bronze or aluminum alloy shall be permanently set in the concrete pad surrounding each well. Coordinates and elevations shall be established for each monitoring well and the trench. The coordinates shall be to the closest 1.0-foot and referenced to the State Plane Coordinate System. Elevations to the closest 0.01-foot shall be provided for the survey marker and for top of the casing at each well. These elevations shall be referenced to the National Geodetic Vertical Datum of 1929.

8.3 The location, identification, coordinates and elevations of all the control points recovered and/or established at the site, all of the wells, and the location of the trench, shall be plotted on a planimetric map (at a scale of 1"=50 feet) to show their location with respect to surface features within the project area. A tabulated list of the monuments and the monitoring wells, including their coordinates and elevations, a "Description Card" for each monument established or used for this project and all field books and computations shall be prepared and submitted to the Huntsville Division (CEHND), ATTN: CEHND-ED-CS. The tabulation shall consist of the designated number of the well or monument, the X- and Y-coordinates and all the required eleva-

tions. The Description Card shall show a sketch of each monument; its location with relative to reference marks, buildings, roads, towers, etc.; a written description telling how to locate the monument from a known point; the monument name or number and the adjusted coordinates and elevations. These items shall be submitted to CEHND no later than the Draft Report Submission.

9.0 SECURITY REQUIREMENTS

9.1 The following requirements must be followed by the AE at Seneca Army Depot to facilitate entry and exit of AE employees and to maintain security.

9.1.1 Personnel Registration:

9.1.1.1 A list of all AE employees, sub-contractors and suppliers indicating firm name and address will be furnished through POC/COR to the Counterintelligence Division, Building 710, 72 hours prior to commencement of work.

9.1.1.2 A confirmation of employment SDSSE-SC Form 268 will be executed by the AE concerning each employee, to include all sub-contractors and their personnel. No forms will be transferred to another file if the AE has other ongoing contracts at SEAD. The AE will provide a list of personnel who are authorized to sign Form 268 for the firm. A sample of each signature is required. Counterintelligence Division must be notified, in writing, of any changes to this list. All completed forms will be provided through COR/POC to the Counterintelligence Division 72 hours prior to commencement of work. Failure to complete Form 268 correctly will result in employee's denial of access to Seneca. The Counterintelligence Division must be notified, in writing through POC/COR to Counterintellignece, at least 72 hours prior to requesting any action. The chain of command for all AE actions will be through POC/COR to Counterintelligence Division. There will be no exceptions.

9.1.1.3 Camera permits require written notice from the POC/COR prior to access. Open camera permits will not be issued. The following information is required:

(a) Camera make, model and serial number.

(b) Contract name and name of individual responsible for the camera.

(c) Dates camera will be used.

(d) Where it will be used.

(e) What will be photographed and why.

9.1.1.4 If a rental, leased or privately owned vehicle is required in place of a company vehicle, the following information is needed.

(a) Name of individual driving.

(b) Year, make, model, color and license plate of the vehicle.

(c) Typed letter on company letterhead indicating that the company assumes responsibility for rental, leased or privately owned vehicles.

9.1.1.5 All access media will be destroyed upon expiration date of contract. If an extension is required a list of employee names and new expiration date must be furnished to the Counterintelligence Division. Contract extensions must be made prior to the contract expiration date or new Form 268s will be required for each individual that requires an extension.

9.1.2 Traffic Regulations:

9.1.2.1 Traffic Laws, State of New York, apply with emphasis on the following regulations.

9.1.2.2 Speed Limit:	Controlled Area	- as posted
	Ammo Area	- 50 mph
	Limited/Exclusion Area	- 25 mph

9.1.2.3 All of the above are subject to change with road conditions or as otherwise posted.

9.1.3 Parking: AE vehicles (trucks, rigs, etc.) will be parked in areas designated by the Director of Law Enforcement and Security. Usually parking will be permitted within close proximity to the work site. Do not park within 30 feet of a depot fence, as these are clear zones.

9.1.4 Gates:

9.1.4.1 Post 1, Main Gate - NY Highway 96, Romulus, New York is open for personnel entrance and exit 24 hours daily, 7 days a week.

9.1.4.2 Post 3, entrance to North Depot Troop Area, located at end of access road from Route 96-A is open 7 days a week for personnel and vehicle entrance and exit.

9.1.5 Security Regulations:

9.1.5.1 Prohibited Property:

9.1.5.1.1 Cameras, binoculars, weapons and intoxicating beverages will not be introduced to the installation, except by written permission of the Director/Deputy Director of Law Enforcement and Security.

9.1.5.1.2 Matches or other spark producing devices will not be introduced into the Limited/Exclusion or Ammo Area's except when the processor of such items is covered by a properly validated match or flame producing device permit.

9.1.5.1.3 All vehicles and personal parcels, lunch pails, etc. are subject to routine security inspections at any time while on depot property.

9.1.5.1.4 All building materials, equipment and machinery must be cleared by the Director of Engineering and Housing who will issue a property pass for outgoing equipment and materials.

9.1.6 AE Employee Circulation:

9.1.6.1 AE employees are cleared for entrance to the location of contract work only. Sight-seeing tours or wandering from work site is NOT AUTHORIZED.

9.1.6.2 Written notification will be provided to the Counterintelligence Division (Ext. 30202) at least 72 hours prior to overtime work or prior to working on non-operating days.

9.1.6.3 Security Police (Ext. 30448/30366) will be notified at least two hours in advance of any installation or movement of slow moving heavy equipment that may interfere with normal flow of traffic, parking or security.

9.1.7 Unions: Representatives will be referred to the Depot Industrial Labor Relations Officer (Ext. 41317).

9.1.8 Offenses: (Violations of law or regulations)

9.1.8.1 Minor: Offenses committed by AE personnel which are minor in nature will be reported by the Director of Law Enforcement and Security to the Contracting Officer who in turn will report such incidents to the AE for appropriate disciplinary action.

9.1.8.2 Major: Serious offenses committed while on the installation will be reported to the FBI. Violators may be subject to trial in Federal Court.

9.1.9 Explosive Laden Vehicles:

9.1.9.1 Vehicles such as vans, cargo trucks, etc. carrying explosives will display placards or signs stating "EXPLOSIVES".

9.1.9.2 Explosive ladened vehicles will not be passed.

9.1.9.3 When an explosive laden vehicle is approaching, pull over to the side and stop.

9.1.9.4 When catching up with an explosive laden vehicle, slow down and allow that vehicle to remain at least 100 feet ahead.

9.1.9.5 When approaching an intersection where an explosive laden vehicle is crossing - STOP - do not enter the intersection until such time as the explosive carrier has passed thru, and cleared the intersection.

9.1.9.6 When passing a vehicle that is parked, and displaying "Explosive" signs, slow down to 10 miles per hour, and take every precaution to allow more than ample clearance.

9.1.10 Clearing Post: All AE employees are required to return all identification badges, and passes on the last day of employment on the depot. The AE is responsible for the completion of all turn-ins by his employees, and informing the Counterintelligence Division and the depot organization administering the contract, for termination of any employee's access to the depot.

10.0 PUBLIC AFFAIRS

The AE shall not publicly disclose any data generated or reviewed under this contract. The AE shall refer all requests for information to SEAD. Reports and data generated under this contract shall become the property of the Department of Defense and distribution to any other source by the AE, unless authorized by the Contracting Officer, is prohibited.

11.0 REFERENCES

11.1 "Procedures Manual for Groundwater Monitoring at Solid Waste Disposal Facilities," USEPA Publ. No. EPA/530/SW-611.

11.2 "Manual of Water Well Construction Practices, " USEPA Publ. NO. EPA/570/9-75-001.

11.3 "Methods of Determining Permeability, Transmissibility, and Drawdown," U.S. Geological Survey Water Supply Paper No. 1536-1, 1963.

11.4 "U.S. Corps of Engineers Safety and Health Requirements Manual," U.S. Army Engineering Manual No. EM-385-1-1, April 1981.

11.5 "Code of Federal Regulations, "Volume 40, Parts 260 through 265 plus 270, July 1986.

11.6 "American Society for Testing and Materials, " ASTM D-421, D-422, D-423, D-424, D-2216, and D-2436.

11.7 "Code of Federal Regulation," Volume 40, Part 300, July 1987.

11.8 "Methods for Chemical Analysis of Water and Wastes," U.S. Environmental Protection Agency, Publ. No. EPA/625/6-7-003a.

11.9 "Test Methods for Evaluating Solid Wastes," USEPA Publ. No. SW- 846, July 1982.

11.10 "Guidelines Establishing Test Procedures for the Analysis of Pollutants Under the Clean Water Act," 40 CFR 136, Federal Register, Oct 26, 1984.

11.11 "RCRA Groundwater Monitoring Technical Enforcement Guidance Document" (Draft) Office of Waste Programs Enforcement, USEPA, August 1985.

11.12 "Handbook for Analytical Quality Control in Water and Wastewater Laboratories," EPA Manual 600/4-79-019, March 1979.

11.13 "Safety and Occupational Health Document Requirements for Hazardous Waste Site Remedial Actions," U.S. Army Engineering Regulation (ER) 385-1-192.

11.14 "Engineer Guidance Design Manual for Architect-Engineer," US Army Corps of Engineer. HNDM-1110-1-1. Rev. 1986.

11.15 RCRA Corrective Action Plan, OSWER Directive 9902.3, November, 1986.

11.16 U.S. Army Toxic and Hazardous Materials Agency (USATHAMA), Initial Installation Assessment of Seneca Army Depot, N.Y. Report no. AMXTH-IR-A-157, 1980.

11.17 U.S. Army Environmental Hygiene Agency (USAEHA), Final Report, Army Pollution Abatement Program Study No. D-1031-W, Landfill Leachate Study, Seneca Army Depot, 1981.

11.18 U.S. Army Toxic and Hazardous Materials Agency (USATHAMA), Update of the Initial Installation Assessment of Seneca Army Depot, N.Y. Report no. AMXTH-IR-A-157(U), 1988.

11.19 "Evaluation of Solid Waste Management Units, Seneca Army Depot", Interim Final Report, Groundwater Contamination Survey No.38-26-0868-88, U.S. Army Environmental Hygiene Agency.

11.20 "Remedial Investigations/Feasibility Studies, Seneca Army Depot Burning Pit/Landfill, Site Investigation", Draft Final Report, ICF Technology Inc., March 1989.

11.21 Draft, "Guidance For Conducting Remedial Investigations/Feasibility Studies Under CERCLA",U.S. EPA, Office of Solid Waste and Emergency Response, March 1988.

11.22 ER 1110-1-263.

29 August 1989 ANNEX G

TREATABILITY STUDY OF THE PROPOSED INTERIM REMEDIAL MEASURES AT THE INCINERATOR ASH LANDFILL SENECA ARMY DEPOT', ROMULUS, NEW YORK

1.0 GENERAL STATEMENT OF SERVICES

1.1 Background. As part of its continuing program of evaluating and upgrading its hazardous waste management facilities, the Army is performing hazardous waste investigations at Solid Waste Management Units (SWMU's) at Seneca Army Depot (SEAD). A recently completed site investigation of the abandoned ash landfill area (SWMU Designations SEAD-3, SEAD-6, SEAD-14 and SEAD-15) has documented the existence of a narrow plume of groundwater contamination which is believed to extend to, and possibly beyond, the Depot's western boundary. The contaminants of concern are chlorinated volatile organic compounds (VOC's); trans-1,2-dichloroethene, trichloroethene and, to a lesser extent, 1,2-dichloroethane, vinyl chloride and chloroform. SEAD has requested the implementation of proposed interim remedial measures to control the plume migration while more detailed studies are being performed to delineate the full extent of the contamination, its source(s) and possible methods of remediation. The US Army Corps of Engineers, Huntsville Division, on behalf of SEAD, is contracting for the required work.

1.2 Location. Seneca Army Depot is a US Army facility located in Seneca County, New York. SEAD occupies approximately 10,600 acres. It is bounded on the west by State Route 96A and on the east by State Route 96. The cities of Geneva and Rochester are located to the northwest (14 and 50 miles, respectively); Syracuse is 53 miles to the northeast and Ithaca is 31 miles to the south. The surrounding area is generally used for farming.

1.3 Regulatory Status. The Incinerator Ash Landfill area of Seneca Army Depot was included on the Federal Facilities National Priorittes List on 13 July 1989. Consequently, all work to be performed under this contract shall

be perfomed according to CERCLA guidance as put forth in the draft "Guidance for Conducting Remedial Investigations/Feasibility Studie under CERCLA", dated March 1988 (Reference 11.21).

1.4 Previous Investigations. Previous investigations have been performed at various SEAD units. An Installation Assessment and Update (USATHAMA Reports No. 157 (1980) and 157(U) (1987), respectively) were conducted by the U.S. Army Toxic and Hazardous Materials Agency. The purpose of the Assessments was to identify potentially contaminated areas at the Depot. The U.S. Army Environmental Hygiene Agency's Groundwater Contamination Survey No. 38-26-0868-88, "Evaluation of Solid Waste Management Units, Seneca Army Depot" identifies and describes all solid waste management units (SWMU's) at SEAD. In addition, a confirmation study has been performed and closure plans are being developed for the burning pads (SEAD-23). A complete list of previous investigations is presented as References in Section 11.0.

1.5 Security Requirements. Compliance with SEAD security requirements is mandated. These requirements are presented in Section 9.0.

2.0 OBJECTIVE

The objective of this project is to verify the effectiveness of the proposed interim remedial measure. This will require that a treatability study be designed and implemented by the AE. After conducting the study, the AE shall evaluate the effectiveness of the interim treatment and make recommendations as to additional actions to be taken for permanent remediation. All work shall be performed under the general supervision of a Professional Engineer registered in the State of New York.

3.0 DETAILED DESCRIPTION OF SERVICES

The AE shall be responsible for performance of the work described in the Tasks below.

3.1 (Task G-1) Visual Inspection and Records Review. The AE shall perform a visual inspection of the site, and review records and reports provided by the Government or available to the AE as published data. The purpose of this Task is to permit the AE's personnel responsible for immediate supervi-

sion and implemention of the contract sufficient time to familiarize themselves with basic site conditions. It is not intended that this be a "discovery" process where new information concerning the site is developed. Prior to commencement of the site visit, an "abbreviated" SHERP must be prepared and submitted in accordance with Section 5.0.

3.2 (Task G-2) Work Plan. The AE shall prepare and provide a Work Plan describing the specific details of a permeable bed treatment system. System material excavation and transport procedures, site layout, equipment, operating procedures, and evaluation methods that the AE proposes to use shall be discussed at appropriate locations within the plan. No field work, with the exception of the initial site visit, may be performed until the plan is reviewed and approved by the Contracting Officer. All work shall be performed according to the approved plan. The Work Plan shall include, as a minimum, the following sub-plans.

3.2.1 AE-SHERP. See Section 5.0 for details.

3.2.2 Quality Assurance Project Plan (QAPP). See Section 6.0 for details.

3.2.3 Monitoring Well Installation Plan. See Section 7.0 for details.

3.3 (Task G-3) Treatment System Design. The AE shall design a permeable treatment bed for the removal of chlorinated VOC's from the groundwater at the incinerator ash landfill area. A trench shall be excavated, sealed to competent bedrock with bentonite grout and lined with a seamless or sealed-seam permeable geotextile. The trench will then be filled with activated carbon or a sand-carbon mixture, sealed at the top, and capped with clay to minimize infiltration. Naturally flowing groundwater will be intercepted by the trench, treated and released to the downgradient side. Monitoring wells, installed prior to the bed installation, will be used to provide baseline data and to monitor the effectiveness of the treatment bed following installation. The AE shall prepare and submit a Design Report, including narrative and drawings, outlining the design specifics of each system to the Contracting Officer for review and approval prior to trench installation. The drawings shall be conceptual (single-line) type and the narrative shall follow the requirements of Section 4.1.

3.3.1 (Subtask G-3.1) Monitoring Wells. The AE shall propose the locations, depth and specific installation of 10 monitoring wells to be placed upgradient and downgradient of the treatment trench. The wells will each be an average of 15 feet deep. General criteria for the installation of wells are presented in Section 7.0.

3.3.2 (Subtask G-3.2) Treatment Trench.. The AE shall propose the location, dimensions and configuration of the treatment trench. It is anticipated that the trench will be 320 feet by 15 feet by 2 feet (length, depth and width, minimum dimensions, respectively). The trench shall be excavated vertically without laying back the sides. This is required to minimize the amount of contaminated soil to be excavated. The AE shall discuss methods to be used to brace the excavation during installation and to provide positive cut-off at the trench/bedrock tie-in.

3.3.3 (Subtask G-3.3) Treatment "Bag". The AE shall design the treatment bag and the composition of its contents. Geotextile type, size and placement, in addition to the mixture percentages of sand/carbon and gradations required, shall be specified. All design assumptions (carbon efficiencies, etc.) shall be presented.

3.3.4 (Subtask G-3.4) Trench Cap. The AE shall design a trench cap for control of infiltration during operation.

3.3.5 Contamination Control Measures. The AE shall discuss in the Design Report measures to prevent the release of contaminants during the installation phase of the treatment system. Methods of excavation and equipment to be used shall be chosen based on the need to prevent releases of contaminated soil and groundwater to the surrounding ground area. Methods of accomplishing this objective shall be discussed in the Design Report.

3.3.6 Air Monitoring Equipment. The AE shall provide in the Work Plan a description of the equipment to be used for the monitoring of air quality during the installation phase. It is anticipated that air quality monitoring will be required, at a minimum, of the ambient air during the excavation phase using portable air monitoring instrumentation. This emissions monitoring shall

be conducted on a real time basis using a portable gas chromatogragh. The AE shall identify in the Sub-Plan specific air sampling locations and frequencies.

3.3.7 Identification of Applicable Regulatory and Permit Requirements. The AE shall identify all applicable local, State and Federal environmental regulations which govern the design, installation and operation of the proposed treatment system. It shall be the responsibility of the AE to obtain all permits required for the installation and operation of the treatment system.

3.4 (Task G-4) Treatment System Installation. The specific requirements for installation of the treatment facilities are outlined in the following subtasks. All subtasks shall be completed according to the approved Work Plans, Design Report and in accordance with applicable Federal and State regulations and permitting requirements.

3.4.1 (Subtask G-4.1) Monitoring Wells. The AE shall install monitoring wells according to the criteria presented in Section 7.0 and as designed in the approved Design Report.

3.4.2 (Subtask G-4.2) Excavation, Sockpiling, and Containerization. The AE shall provide necessary labor and equipment and be responsible for all grubbing, excavation, dewatering, stockpiling, and containerization. The AE shall utilize excavation methods/procedures that were approved in the Work Plan. The excavation locations as approved in the Work Plan shall not be deviated from by the AE. The AE shall assume that all excavated soil and dewatered groundwater is to be considered hazardous and shall be handled accordingly. The AE shall stockpile the excavated soil alongside the trench by placing the soil on a 20-mil minimum thickness synthetic seamless or welded-seam impermeable membrane. The stockpile shall then be covered with the same membrane. The AE shall design a system of berms to contain the excavated soils and soil leachate. The design shall be sufficient to preclude movement of contaminants outside the stockpile and pile base area. The AE shall containerize the dewatered groundwater in an area adjacent to the trench. The containers may be either DOT approved 55-gallon drums, enclosed tank, or an open above-ground synthetic impermeable membrane lined pool with cover. The

AE shall sample the excavated soil and dewatered groundwater to determine if they are in fact hazardous. If the analytical testing indicates they are hazardous, the Government will be responsible for disposal. If they are non-hazardous, the soil and groundwater will remain on site. The AE shall be responsible for compliance with all Resource Conservation and Recovery Act (RCRA) requirements for removal of hazardous wastes. The AE shall be responsible for acquiring all permits necessary for installation and operation of the trench. Methods for accomplishing the objectives shall be discussed in the Design Report.

3.4.3 (Subtask G-4.3) Sampling and Chemical Analysis of Excavated Soils. The AE shall conduct the following sampling and chemical analysis:

3.4.3.1 The AE shall conduct two rounds of soil sampling for chemical analysis. The first round shall be taken during the excavation of the trench. The second round shall be taken following trench installation. The soil samples collected under this task shall be analyzed according to the requirements of Tables 1 and 2. In addition, Quality Control/Quality Assurance (QC/QA) samples shall be taken and analyzed according to the requirements of Tables 1 and 2. A total of 12 soil samples shall be analyzed under this Subtask. Soil sampling and analysis shall conform to the requirements of the approved Work Plan. Results of sampling and analysis shall be presented in the Engineering Report.

TABLE 1

Number of Samples to be Collected and Analyzed (Subtask G-4.3)

(Soil, Leachate and Control Samples.)

Type/Location of Samples To Be Collected and Analyzed.	Field Samples	QC/QA Samples		Total Samples Collected
		AE's QC Samples Splits	CEMRD QA Samples Splits	
Round 1 (During Excavation)	3	1	1	5
Round 2 (Following Install.)	3	1	1	5
Leachate	3	1	1	5
Totals (Basic)	9	3	3	15

* CEMRD (QA) samples shall be collected by the AE and sent to the government laboratory for analysis that will be conducted by the Government.

** 15 is the total to be collected by the AE; however, laboratory analysis shall be limited to only field and QC samples (total 12).

Field samples must include at least one "background" soil sample.

TABLE 2

Required Analyses, Approved EPA Methods and Estimated Quantities

Subtask G-4.3

Rounds	Method Description	Method	Field Samps	Number of QA/QC Samps**
One	B/N/A	8270	3	1
(During Excavation)	Volatile Organics	8240	3	1
	Metals*	6010	3	1
	Arsenic	7060	3	1
	Selenium	7740	3	1
	Mercury	7470	3	1
Two	B/N/A	8270	3	1
(Following Installation)	Volatile Organics	8240	3	1
Leachate	B/N/A	8270	3	1
	Volatile Organics	8240	3	1

* Metals Analysis: Method 6010 shall include Barium, cadmium, chromium, lead, antimony, copper, nickel, thallium, zinc and beryllium.

** The numbers presented are the samples to be analyzed by the AE's laboratory. QA samples as stated in Table 1 shall be collected by the AE and sent to the CEMRD laboratory for analysis.

3.4.4 (Subtask G-4.4) Sampling and Chemical Analysis of Dewatered Groundwater. The AE shall conduct the following sampling and chemical analysis:

3.4.4.1 The AE shall conduct two rounds of dewatered groundwater sampling for chemical analysis. The first round shall be taken during the excavation of the trench. The second round shall be taken following trench installation. The groundwater samples collected under this task shall be analyzed according to the requirements of Tables 3 and 4. In addition, Quality Control/Quality Assurance (QC/QA) samples shall be taken and analyzed according to the requirements of Tables 3 and 4. A total of 12 groundwater samples shall be analyzed under this Subtask. Groundwater sampling and analysis shall conform to the requirements of the approved Work Plan. Results of sampling and analysis shall be presented in the Engineering Report.

3.5 (Task G-5) Treatment System Operation. The AE shall monitor the effectiveness of the treatment system through periodic sampling of the wells placed upgradient and downgradient. Monitoring wells shall be sampled immediately prior to and following system installation and thereafter at four-month intervals for 1 year. Five rounds of monitoring well sampling shall be conducted as shown in Table 3. In addition, Quality Control/Quality Assurance (QC/QA) samples shall be taken and analyzed according to the requirements of Tables 3 and 4.

TABLE 3
Number of Samples to be Collected and Analyzed
(Monitoring Wells, Dewatered Groundwater, and Control Samples.)

Samples To Be Collected and Analyzed	Field Samples	QC/QA Samples				Total Samples
		Sample Blank, Rinsate	AE's QC Samples Split	CEMRD QA Samples Split	Sample Blank, Rinsate	
MONITORING WELLS:						
Round 1 (Prior to installation)	10	1	1	1	1	14
Round 2 (Following installation)	10	1	1	1	1	14
Round 3 (After 4 months)	10	1	1	1	1	14
Round 4 (After 8 months)	10	1	1	1	1	14
Round 5 (After 1 year)	10	1	1	1	1	14
DEWATERED GROUNDWATER:						
Round 1 (During Excavation)	2	1	1	1	1	6
Round 2 (Following installation)	2	1	1	1	1	6
Totals	54	7	7	7	7	84

* CEMRD (QA) samples shall be collected by the AE and sent to the Government laboratory in Omaha, Nebraska for analysis that will be conducted by the Government.
** 84 is the total to be collected by the AE; however, laboratory analysis shall be limited to only field and QC samples (total 77).

TABLE 4
Required Analyses, Approved EPA Methods and Estimated Quantities

Rounds	Method Description	Method	Field Samps	# QA/QC Samps
MONITORING WELLS:				
One	B/N/A	8270	10	4
(Prior to	Volatile Organics	8240	10	4
installation)	Metals*	6010	10	4
	Arsenic	7060	10	4
	Selenium	7740	10	4
	Mercury	7470	10	4
Two	B/N/A	8270	10	4
(Following	Volatile Organics	8240	10	4
installation)				
Three	B/N/A	8270	10	4
(After 4 mo.)	Volatile Organics	8240	10	4
Four	B/N/A	8270	10	4
(After 8 mo.)	Volatile Organics	8240	10	4
Five	B/N/A	8270	10	4
(After 12 mo.)	Volatile Organics	8240	10	4
DEWATERED GROUNDWATER:				
One	B/N/A	8270	4	2
(During	Volatile Organics	8240	4	2
Excavation)	Metals*	6010	4	2
	Arsenic	7060	4	2
	Selenium	7740	4	2
	Mercury	7470	4	2
Two	B/N/A	8270	4	2
(Following	Volatile Organics	8240	4	2
installation)				

* Metals Analysis: Method 6010 shall include Barium, cadmium, chromium, lead, antimony, copper, nickel, thallium, zinc and beryllium.

3.6 (Task G-6) Tri-annual Reports. The AE shall prepare tri-annual reports fully document the results of sampling accomplished in Task G-5. These reports shall be submitted within 14 days of completion of the testing. Specifically, each report shall present the following information:

o A summary of all analytical results that have become available during the previous four months.

o Supporting QC/QA documentation.

o All groundwater level data collected during the four-month sampling event.

o Groundwater flow maps based on the most recent four-months of groundwater level data.

o Isopleth maps for the applicable contaminants.

o Well maintenance activities planned or performed.

o Summary of well installation activities performed in the last four months, including well logs, installation details, field data collected and surveyed well locations. Existing reports may be referenced.

o Any problems or planned activities.

o An evaluation of the progress of the study based on the information provided in the items above.

3.7 (Task G-7) Engineering Report. The AE shall prepare an engineering report which fully documents all work performed. The report shall present descriptions of the existing site conditions, field work performed and the results of chemical analyses. More specifically, the report shall include discussions of the following.

3.7.1 Findings/Results/Conclusions from Round 1 Monitoring Well and Dewatered Groundwater Sampling

3.7.2 Findings/Results/Conclusions from Round 2 Monitoring Well and Dewatered Groundwater Sampling

3.7.3 Findings/Results/Conclusions from Round 3 Monitoring Well Sampling

3.7.4 Findings/Results/Conclusions from Round 4 Monitoring Well Sampling

3.7.5 Findings/Results/Conclusions from Round 5 Monitoring Well Sampling

3.7.6 Findings/Results/Conclusions from Round 1 Excavated Soil Sampling

3.7.7 Findings/Results/Conclusions from Round 2 Excavated Soil Sampling

3.7.8 Detailed Evaluation of Treatment Results

3.7.9 Discussion of Problem Areas and Operational Constraints

3.7.10 Recommendations for Further Actions

3.8 (Task G-8) Presentations and Meetings.

3.8.1 Informal Presentation. The AE shall conduct two informal presentations. One will be conducted after the draft work plan and the other after the draft engineering report. A meeting will follow each informal presentation. Presentations will be conducted at SEAD. Comments generated as a result of Government review and comments at the informal presentations shall be incorporated into the submittals by the AE. The AE shall assume that the two informal presentation/meeting will last one day each, and that two AE personnel will attend (one project manager and one technical person).

3.8.2 Formal Presentation. After the final submittal, the AE shall conduct a formal presentation of the Engineering Report and the conclusions that were reached. The formal presentation will follow a meeting in which only Government personnel and the AE will be involved. This meeting will occur in the morning session and the formal presentation in the afternoon. The AE shall assume that both the informal meeting and the formal presentation will be conducted at SEAD. During the formal presentation, the AE shall utilize handouts, vugraphs, charts and maps, as required, to illustrate the conclusions of the Engineering report. The proposed audience consists of the SEAD Commander and other installation representatives, Government personnel involved with the decision process, and regulatory agencies. All comments made shall be addressed and incorporated into the Engineering Report by the AE. The AE may assume that the meeting/formal presentation will last one day, and that one technical person and one project manager shall attend.

4.0 SUBMITTALS AND PRESENTATIONS

4.1 Format and Content of Engineering and Design Reports. The Engineering and Design Reports presenting all data, analyses, and recommendations shall be prepared in the AE's standard format for engineering and design reports. All drawings shall be of engineering quality in drafted form with sufficient detail to show interrelations of major features on the installation site map. When drawings are required, data may be combined to reduce the number of drawings. The report shall consist of 8-1/2" x 11" pages with drawings folded, if necessary, to this size. A decimal paragraphing system shall be used. The report covers shall consist of vinyl three-ring binders and shall hold pages firmly while allowing easy removal, addition, or replacement of pages. A report title page shall identify the AE, the Corps of Engineers, Huntsville Division, and the date. The AE identification shall not dominate the title page. This Statement of Work shall be incorporated in the draft report only. Submittals shall include incorporation of all previous review comments accepted by the AE as well as a section describing the disposition of each comment. Disposition of comments submitted with the final report shall be separate from the report document. All final submittals shall be sealed by the registered Professional Engineer-In-Charge.

4.2 Conference Notes. The AE will be responsible for taking notes and preparing the reports of all conferences, presentations, and review meetings. Conference notes will be prepared in typed form and the original furnished to the Contracting Officer (within five (5) working days after date of conference) for concurrence and distribution to all attendees. This report shall include the following items as a minimum:

a. The date and place the conference was held with a list of attendees. The roster of attendees shall include name, organization, and telephone number.

b. Written comments presented by attendees shall be attached to each report with the conference action noted. Conference action as determined by the Government's Project Manager shall be "A" for an approved comment, "D" for a disapproved comment, "W" for a comment that has been withdrawn, and "E" for a comment that has an exception noted.

c. Comments made during the conference and decisions affecting criteria changes, must be recorded in the basic conference notes. Any augmentation of written comments should be documented by the conference notes.

4.3 Confirmation Notices. The AE will be required to provide a record of all discussions, verbal directions, telephone conversations, etc., participated in by the AE and/or representatives on matters relative to this contract and the work. These records, entitled "Confirmation Notices", will be numbered sequentially and shall fully identify participating personnel, subject discussed, and any conclusions reached. The AE shall forward to the Contracting Officer as soon as possible (not more than five (5) work days), a reproducible copy of said confirmation notices. Distribution of said confirmation notices will be made by the Government.

4.4 Progress Reports and Charts. The AE shall submit progress reports to the Contracting Officer with each request for payment. The progress reports shall indicate work performed, and problems incurred during the payment period. Upon award of contract, the AE shall, within 15 days, prepare a progress chart to show the proposed schedule for completion of the project. The progress chart shall be prepared in reproducible form and submitted for approval. The actual progress shall be updated and submitted by the 15th of each month and may be included with the request for payment.

4.5 Completion Dates.

Draft Abbreviated SHERP	17 Oct 89
Final Abbreviated SHERP	3 Nov 89
Draft Work Plans	21 Nov 89
Informal Meeting/Presentation at SEAD	6 Dec 89
Draft-Final Work Plans	20 Dec 89
Draft Design Report	20 Dec 89
Final Work Plans	19 Jan 90
Final Design Report	19 Jan 90
Government Approval of Design Report	5 Feb 90
Completion of Monitoring Well Installation	9 Feb 90
Completion of Trench Installation	16 Mar 90
Draft Engineering Report	16 Apr 91

Informal Meeting/Presentation at SEAD	2 May 91
Final Engineering Report	4 Jun 91
Formal Meeting/Presentation at SEAD	18 Jun 91

The overall completion date for this delivery order shall be 1 Aug 1991.

4.6 Submittals.

4.6.1 General Submittal Requirements.

4.6.1.1 Distribution. The AE is responsible for reproduction and distribution of all documents. The AE shall furnish copies of submittals to each addressee listed in paragraph 4.6.3 in the quantities listed in the document submittal list. Submittals are due at each of the addressees not later than the close of business on the dates shown in paragraph 4.5.

4.6.1.2 Partial Submittals. Partial submittals will not be accepted unless prior approval is given.

4.6.1.3 Cover Letters. A cover letter shall accompany each document and indicate the project, project phase, the date comments are due, to whom comments are submitted, the date and location of the review conference, etc., as appropriate. (Note that, depending on the recipient, not all letters will contain the same information.) The contents of the cover letters should be coordinated with CEHND-ED-PM prior to the submittal date. The cover letter shall not be bound into the document.

4.6.1.4 Supporting Data and Calculations. The tabulation of criteria, data, circulations, and etc., which are performed but not included in detail in the report shall be assembled as appendices. Criteria information provided by CEHND need not be reiterated, although it should be referenced as appropriate. Persons performing and checking calculations are required to put their full names on the first sheet of all supporting calculations, and etc., and initial the following sheets. These may not be the same individual. Each sheet should be dated. A copy of the final scope of services shall be included as appendix A in the report.

4.6.1.5 Reproducibles. One camera-ready, unbound copy of each submittal shall be provided to the Contracting Officer in addition to the submittals required in the document and submittal list. All final submittals shall

also be provided to the Contracting Officer on floppy disks compatible with the Intel 310/80286 computer with XENIX release 3.0 update 2 operating system in ASCII format and Wordstar 2000 Release 2 format.

4.6.2 Specific Submittal Requirements.

a. Abbreviated SHERP (Task G-1) (Draft and Final).

b. Work Plans (Task G-2) (Draft, Draft-Final and Final).

c. Design Report (Task G-3) (Draft and Final).

d. Tri-Annual Reports (Task G-6).

e. Engineering Report (Task G-7) (Draft and Final).

4.6.3 Addressees.

Commander
U.S. Army Corps of Engineers
Huntsville Division
ATTN: CEHND-ED-PM (Mr. Walt Perro)
PO Box 1600
Huntsville, AL 35807-4301

Commander
U.S. Army Depot Systems
Command (DESCOM)
ATTN: AMSDS-EN-FD
(Mr. Tim Toplisek)
Chambersburg, PA 17201

Commander
U.S. Army Environmental
Hygiene Agency (USAEHA)
ATTN: HSHB-ES-G
Building 1677
Aberdeen Proving Ground, MD 21010-5422

Commander
US Army Corps of Engineers
Missouri River Division
ATTN: CEMRD-ED-EA (Mr. Doug Plack)
PO Box 103, Downtown Station
Omaha, NE 68101-0103

Commander
U.S. Army Material Command (USAMC)
ATTN: AMCEN-A (Mr. Bob King)
5001 Eisenhower Ave.
Alexandria, VA 22333-0001

Commander
US Army Corps of Engineers
Missouri River Division
ATTN: CEMRD-ED-GL
PO Box 103, Downtown Station
Omaha, NE 68101-0103

Commander
U.S. Army Corps of Engineers
Toxic and Hazardous Materials Agency
ATTN: CETHA-IR-D (Katherine Gibson)
Aberdeen Proving Ground, MD 21010-5401

Commander
Seneca Army Depot
ATTN: SDSSE-HE (Randy Battaglia)
Romulus, NY 14541

Commander
US Army Corps of Engineers,
North Atlantic Division,
ATTN: CENAD-CO-EP
90 Church Street
New York, NY 10007-9998

Commander
HQUSACE
ATTN: CEMP-RI
20 Massachusettes Ave., NW
Room 2209
Washington, D.C. 20314-1000

4.6.4 Document and Submittal List.

	Abbrev. SHERP		Work Plans			Design Rpt.	
	Draft	Final	Draft	Draft-Final	Final	Draft	Final
CEHND-ED-PM	6	6	6	6	6	6	6
USAMC	0	0	1	1	1	1	1
DESCOM	0	0	2	2	2	2	2
CETHA-IR-D	2	2	2	2	2	2	2
CEMRD-ED-EA	3	3	3	3	3	3	3
CEMRD-EA-GL	0	0	1	1	1	1	1
SDSSE-HE	10	10	10	10	10	10	10
CENAD-CO-EP	0	0	0	0	1	0	1
USAEHA	0	0	7	0	7	1	1
CEMP-RI	0	0	1	0	1	0	1
TOTAL	21	21	33	25	34	26	28

	Engr. Rpt.		Tri-Annual
	Draft	Final	Reports
CEHND-ED-PM	6	6	6
USAMC	1	1	1
DESCOM	2	2	2
CETHA-IR-D	2	2	2
CEMRD-ED-EA	3	3	3
CEMRD-EA-GL	1	1	1
SDSSE-HE	10	10	10
CENAD-CO-EP	1	1	1
USAEHA	1	1	1
CEMP-RI	0	1	0
TOTAL	27	28	27

5.0 SAFETY REQUIREMENTS.

Site activities in conjunction with this project may pose unique safety, chemical, and/or biological exposure hazards which require specialized expertise to effectively address and eliminate. The AE shall prepare and submit a Safety, Health and Emergency Response Plan (SHERP) to the Contracting Officer (CO) which shall address accident prevention, personal protection against chemical exposures, and emergency response procedures. The SHERP shall establish in detail the protocols necessary for protecting workers and on-site personnel, the public, and the environment from any hazards associated with well installation, soil borings, water sampling, and sediment sampling equipment

and procedures; and from hazards associated with potential exposures from chemicals, agents, or situations suspected or known to be on the site. A Draft SHERP shall be submitted as a separately bound document to the CO for approval prior to the commencement of any on-site activity which, with revisions, will stand as the Final SHERP for this site. For initial site entry activities, an "abbreviated" SHERP shall be prepared and implemented. This "abbreviated" SHERP need not be as detailed as the Final SHERP covering all other field activities. However, as a minimum, the "abbreviated" SHERP shall address tasks to be performed, the potential hazards (if any) resulting from those activities, and the measures to be implemented (personal protective equipment, monitoring, etc.) to protect personnel while on-site. Remaining field work shall not be performed until the Final SHERP has been reviewed and approved by the CO. All work shall be performed according to the approved SHERPs. The SHERPs shall be prepared in accordance with the requirements specified in this section. The SHERPs must be prepared and administered by a Certified Industrial Hygienist (CIH). Qualifications for the CIH shall consist of training and experience commensurate with the hazards to be encountered for the project. The SHERPs shall comply with all federal, state, and local health and safety requirements, e.g., the Occupational safety and Health Administration (OSHA) requirements (29 CFR 1910 and 1926), the U.S. Environmental Protection Agency (USEPA) hazardous waste requirements (40 CFR 260-270), the U.S. Army Corps of Engineers Safety and Health Requirements Manual (EM 385-1-1), and the U.S. Army Materiel Command Safety Manual, AMC-R 385-100. The SHERPs shall include but not limited to:

5.1 Organization/Administration. The AE shall assign responsibilities for safety activities and procedures. A Certified Safety Professional (CSP) shall be designated to implement the SHERPs for all onsite activities. A person certified in first aid/CPR by the Red Cross or equivalent, shall be continuously present on-site during operations.

5.2 Standard Operating Procedures (SOPs). The AE shall outline standard operating procedures (SOPs) for preventing accidents, and protecting personnel from injury and occupational illness for all operations having a significant accident potential. Approved SOPs will be made available to prime and subcontractor personnel for personnel information guidance and compliance.

5.3 Identification of Hazards. The AE shall review existing records and data to identify potential hazards associated with the designated drilling and sampling sites and to evaluate their impact on field operations. The AE shall develop action levels for controlling worker exposure to the identified hazards in accordance with appropriate requirements.

5.4 Personal Protective Equipment. The AE shall provide appropriate personal protective equipment (PPE) to ensure workers, official visitors and government employees are protected from exposure to recognized physical hazards and protected from exposure to hazardous chemical concentrations above the action level (Levels A, B, C, D, and modifications) for each operation stated for each work zone. The level of protection shall be specified in the SOP for each operation. The AE shall provide and maintain all PPE.

5.5 Safety and Health Training. The AE shall, as a minimum provide training to his employees complying with the requirements of 29 CFR 1910.120. The program shall inform employees, official visitors and government employees of the special hazards and procedures (including PPE, its use and inspection) to control these hazards during field operations. Employees shall be trained in emergency procedures, areas of restricted access, methods of decontamination, and general safety. All prime and subcontractor personnel shall complete this program prior to beginning on-site work. The AE shall keep individual training records on all workers associated with the project and submit a copy of these records in the draft SOP.

5.6 Monitoring. The AE shall provide continuous monitoring of the identified hazards associated with the designated drilling sites for controlling worker exposure during field operation. When applicable, National Institute for Occupational Safety and Health (NIOSH) approved sampling and analytical methods must be used.

5.7 Emergency Procedures. The AE shall establish procedures to take emergency action in the event of immediate hazards, i.e.,a chemical agent leak or spill, fire, or personal injury. The AE designated CSP shall serve as the emergency coordinator. Personnel and facilities providing support in emergency procedures shall be identified. Specify the emergency equipment to be present on-site and the Emergency Response Plan procedures, as required by 29 CFR 1910.120 (1) (1) (ii).

5.8 Medical Surveillance. Prime and subcontractor personnel shall have medical examinations prior to commencement of work. The medical examination results shall be evaluated by a board-certified or board-eligible licensed physician practicing occupational medicine to determine if the individual is physically fit for the work to be performed and that no physical condition or disease would be aggravated by exposure to the identified hazards. Medical records shall be available for review by the CO upon request. Specify exam content and frequency.

5.9 First Aid. The AE shall provide appropriate emergency first aid equipment suitable for treatment of exposure to identified hazards, including chemical agents. A vehicle shall be made available to transport injured workers to medical facilities identified in the SHERP.

5.10 Accident Prevention, Recording and Recordkeeping. An accident prevention plan and description of work phase safety plans shall be addressed, as discussed in Paragraphs 01.A.03 thru 01.A.06 and Appendix Y of COE EM 385-1-1 for those topics not specifically addressed by this listing. The AE shall immediately notify the CO of any accident/incident. Within two working days of any reportable accident the AE shall complete and submit to the CO an Accident Report on ENG Form 3394 in accordance with AR 385-40 and OCE supplement 1 to that regulation.

5.11 Safety Inspection. The AE shall conduct regular safety inspections to determine if operations are being conducted in accordance with established SOPs.

5.12 Site Layout and Control. Include a site map, work zone delineation, on/off-site communications, site access controls, and security (physical and procedural). The AE will determine three areas; exclusion, contamination

reduction and support, for each work site. No person shall be allowed entry into the exclusion and contamination reduction areas unless in compliance with Sections 5.4, 5.5, and 5.8.

5.13 Air Monitoring Program. Specify the types and frequency of air monitoring/sampling to be performed. Include real-time (direct-reading) monitoring and integrated (TWA) sampling for specific contaminants of concer, as appropriate. Discuss instrumentation and calibration to be performed.

5.14 Health and Safety Work Precautions. Buddy system, eating and drinking precautions, smoking and ignition sources, potentially hazardous noise, explosive atmosphere, illumination, heat or cold stress, confined space entry precautions, eye wash stations, fire extinguishers, sanitation, and routine safety inspections shall be discussed.

5.15 Personnel and Equipment Decontamination. Specify decon facilities and procedures for personnel protective equipment, sampling equipment, and heavy equipment.

5.16 Logs, Reports, and Recordkeeping. Safety inspection reports, accident/incident reports, medical certifications, training logs, monitoring results, etc. All exposure and medical monitoring records to be maintained according to OSHA standard 29 CFR 1910.20.

5.17 Unexploded Ordnance. The facility is a military installation and has been used for storage, evaluation and disposal of ordnance and/or explosive materials as well as for military training. If explosive contamination or unexploded ordnance is discovered at any time during operations at the site the AE shall mark the location, immediately stop operations in the affected area, and notify the CO. The Government will make appropriate arrangements for evaluation and proper disposal of the device. It is anticipated that in the unlikely event that such conditions arise, they will be overcome with only slight delays to the AE. It is the express intention of the Government that the AE is not to drill, excavate, or otherwise disturb the subsurface in areas where ordnance or explosives may reasonably be suspected unless specific, detailed plans to do so are prepared and approved.

5.18 Suggested SHERP Format.

STAFF ORGANIZATION
- Principal Engineer
- Program Manager
- Certified Industrial Hygienist
- Certified Safety Professional
- First Aid/CPR Personnel
- Field Personnel
- Subcontractor Personnel

HAZARD COMMUNICATION AND TRAINING
- Comprehensive Health and Safety Indoctrination
- Specialized Training
- Visitor Training
- Pre-Investigation Health and Safety Briefing
- Post-Investigation Health and Safety Briefing
- Morning Safety Meetings

MEDICAL SURVEILLANCE
- Medical Surveillance
- Licensed Occupational Physician
- Medical Examinations

EXPOSURE MONITORING
- Environmental and Personnel Monitoring
- Meteorological Monitoring
- Sampling and Analytical Methods
- Heat/Cold Stress Monitoring

HEALTH AND SAFETY EQUIPMENT
- Personal Protective Equipment
- Environmental Monitoring Equipment
- Decontamination Equipment
- Emergency Equipment
- Emergency-Use Respirators
- Spill Control Equipment
- Fire Extinguishers
- First Aid Equipment and Supplies
- Emergency Eye Wash/Shower (ANSI Z358.1)
- Personnel Hygiene
- Personnel Decontamination
- Communications

STANDARD OPERATING PROCEDURES
- Health and Safety Site Plan
- Site Description
- Site Inspection
- Site Security
- Site Entry Procedures

Responsibilities
Work Zones
Hazard Evaluation
Activity Hazard Analysis
Accident Prevention
Accident Reporting
Safe Work Practices
Confined Space Entry Procedures
Material Handling Procedures
Levels of Protection
Decontamination Procedures
Emergency Information
Emergency Response Plan
Illumination
Sanitation
Well Installation/Logging
Sampling
Land Survey
Laboratory Analysis
Logs, Reports, and Recordkeeping

6.0 QUALITY ASSURANCE PROJECT PLAN REQUIREMENTS

The AE shall prepare and submit the Quality Assurance Project Plan (QAPP) according to the requirements of this section, ER 1110-1-263, and the definitions given in Paragraph 6.9. The site specific field and laboratory QC/QA plan shall be included. The AE shall propose only methods and procedures in the work plans acceptable to EPA and the State of New York.

6.1 Approval. The work plan must be approved by the CO prior to performing any field work. In the event corrections or comments are made by the CO on the draft work plan, any necessary changes shall be implemented by the AE before final approval.

6.2 AE Responsibility for Chemical Analyses. It is the responsibility of the AE to properly collect, transport, analyze and present the data pertaining to chemical analysis. If the AE or his subcontractor does not follow the specified criteria and approved work plans and thereby jeopardizes the samples, the Contracting Officer will disapprove the samples and direct the AE to resample, analyze, and present the data at no additional cost to the Government. If directed to do so by the Contracting Officer, the AE shall collect and send representative "split" samples to the US Army Corps of En-

gineers, Missouri River Division Laboratory (CEMRD-ED-GC, 402-221-7324). The AE will not be responsible for the analysis of the "split" samples or subsequent reporting results. The AE, however, is required to defend his results if there is disagreement between the samples analyzed by the AE and the samples analyzed by the CEMRD laboratory.

6.3 Content and Format. The plan shall address each of the topics in Paragraphs 6.4 through 6.8.2. The following outline shall be used as applicable.

SECTION 1.0 PROJECT ORGANIZATION AND RESPONSIBILITY
SECTION 2.0 SAMPLING
- 2.1 Selection of Sampling Locations
- 2.2 Samples to be Collected
  - 2.1.1 Soil/Leachate Samples
  - 2.1.2 Groundwater Samples
  - 2.1.3 QC/QA Samples
- 2.3 Sample Collection Methods and Equipment
- 2.4 Sample Containers
- 2.5 Sample Preservation
- 2.6 Identification
- 2.7 Transportation and Custody

SECTION 3.0 ANALYSES
- 3.1 Parameters
- 3.2 Analytical Methods and Detection Limits
- 3.3 Laboratory QC/QA

SECTION 4.0 DATA ANALYSIS AND REPORTING
SECTION 5.0 PROGRAM CONTROLS
SECTION 6.0 AIR MONITORING

6.4 Project Organization and Responsibility. The project organization for the prime contractor and any subcontractors shall be clearly defined with a discussion of quality control responsibilities. The AE's Quality Control (QC) Officer shall report to a responsible senior officer of the company, that is, QC management shall be separate from project management. A list of key individuals shall be provided, including those with QC responsibilities.

The project-related qualifications of the AE's analytical laboratory shall be addressed in terms of equipment, facilities, and personnel. Names of laboratory supervisors, chemists, technicians and QC officers shall be given with brief resumes chronologically listing education and experience. The project schedule and list of responsible persons shall be stated.

6.5 Sampling. Unless otherwise specified in this SOW and contract, all sampling and sample custody procedures shall be consistent with EPA and State of New York guidelines.

6.5.1 Selection of Sampling Locations. For sampling sites to be chosen in the field, the plan shall describe the rationale that will govern their selection. The plan shall provide the location of each known sampling point on a site map. The plan shall discuss geological and hydrological influences on sample location, and provisions to insure that samples are representative of the site through the use of appropriate field control samples.

6.5.2 Samples to be Collected. The plan shall list or tabulate the samples to be collected, showing the number of samples, locations and analytes. The list shall include field controls. Samples collected and prepared in the field shall include: soil samples, groundwater samples, and field control samples.

6.5.2.1 Soil Samples. The plan shall list or tabulate samples to be collected from the soil borings and test pits for chemical analysis, indicating number, location, depth and analyses required.

6.5.2.2 Groundwater Samples. Each of the groundwater monitoring wells shall be sampled once, by the procedure specified in Paragraph 6.5.3.2. All sampling of wells installed under this delivery order shall be accomplished within a period not exceeding five consecutive days. All samples to be analyzed for metals shall be filtered at the time of collection through filter membranes with a nominal pore size of 0.45 microns.

6.5.2.3 Field Control Samples. A minimum of 10% of all groundwater samples collected shall be QC/QA (5% QC, 5% QA). At least two sampling blanks (1 QC, 1 QA) and two duplicates (1 QC, 1 QA) shall be collected. If samples are to be tested for volatiles, at least two travel blanks shall be included (1 QC, 1 QA).

6.5.2.4 Summary. The types and numbers of samples required are summarized in "Number of Samples to be Collected and Analyized", Tables 1 and 3.

6.5.3 Sample Collection Methods and Equipment. The plan shall include specific sampling procedures and equipment to be used to collect the various samples. Appropriate references or descriptions shall be given as needed including sample sizes, containers, equipment, etc. Collection and preservation methods shall be consistent with the specified analytical methods and other standards.

6.5.3.1 Prevention of Cross-Contamination. The plan will describe cleaning of equipment and precautions for preventing contamination of samples during collection.

6.5.3.2 Groundwater Sampling. Before a sample is collected from a well, the depth to water from the surveyed reference point shall be measured and recorded. Then the well shall be pumped or bailed with clean equipment to remove a quantity of water equal to at least five times the submerged volume of the casing. If the well does not recharge fast enough to permit removing five casing volumes, the well shall be pumped or bailed dry, and allowed to recharge for four hours. If the well has recharged to greater than 50 percent of the static water level, then two to three well volumes shall be removed. If the well does not recover to 50 percent of the static water level in four hours, then the well shall be pumped dry a second time and sampled as soon as sufficient recharge has occurred. The sample taken from the well for chemical analyses shall be collected from the screened portion of the well and not from the overlying riser section or the underlying sand-sump section of the well. The plan shall describe details of the sample collection procedure.

6.5.3.3 Collection of Soil Samples. The plan shall include complete details of the proposed procedure for collecting soil samples.

6.5.4 Sample Containers. List the composition and volume of containers to be used according to sample type and analyte. Describe cleaning and other preparation of containers.

6.5.5 Sample Preservation. List or tabulate the required preservation methods and maximum holding times, by sample type and analyte.

6.5.6 Identification. Describe the proposed system for identifying, labeling and tracking samples. Include recording of field data in permanently bound notebooks, and the system for relating field data to the proper samples.

6.5.7 Transportation and Custody. Describe packing, shipping or other transportation and custody documentation, in accordance with "Sample Handling Procedures," HND Guideline, September, 1986.

6.6 Analyses.

6.6.1 Parameters. The plan shall tabulate the samples to be collected, each analyte to be investigated, analyses to be performed, and associated predicted detection limit for each analyte. Analysis as listed in the SOW shall be performed on each field sample as well as on field controls sent to the AE's laboratory or subcontract laboratory. Laboratory controls (internal QC samples) are not listed, but shall be included in the approved QAPP. Alternate methods and variation in procedures to those in this SOW may be used if approved by the CO and described in the approved plan.

6.6.2 Analytical Methods. Each proposed method must be specified exactly and in detail by one of the following: (1) Reference to an accepted published method, e.g., an EPA, SM, or ASTM method, if the published procedure is followed exactly, or (2) reference to an accepted published method with a description of any deviations from the published procedure, or (3) complete description of the procedure, e.g., copies of laboratory instructions. Descriptions of any pre-treatment or preparation of the sample required before the actual analysis shall be included. Include the required concentration ranges, and data on the sensitivity (detection limits), precision and accuracy, by analyte and sample matrix in the descriptions of methods. Detection limits shall correspond to the Contract Laboratory Program of the USEPA. Indicate how pre-existing data on sensitivity, precision and accuracy were determined, and procedures to be used to validate the methods for the matrices in question.

6.7 Data Analysis and Reporting. For each analytical method and major measurement parameter, the following information shall be provided:

6.7.1. The data analysis scheme including units and equations required to calculate concentrations or the value of the measured parameter.

6.7.2. Plans for treating results that appear unusual or questionable. Describe the feedback systems used to identify problems by means of the results obtained from control samples. Limits of data acceptability shall be included with the corrective action to be taken when these limits are exceeded. Personnel responsible for initiating and carrying out corrective action shall be indicated. Describe how re-establishment of control is demonstrated. Unacceptable contamination levels in blanks, and the maximum acceptable disagreement between replicate samples and analyses shall be stated in the QAPP. These limits shall correspond to those required by the Contract Laboratory Program of the USEPA. Corrective action to be taken when these limits are exceeded shall be described, and the circumstances that require collection of new samples at no additional cost to the Government shall be specified.

6.7.3. Description of the data management systems, including the collection of raw data, data storage and data quality assurance documentation.

6.7.4. Identification of individuals to be involved in the reporting sequence.

6.7.5. Description or illustration of the proposed data reporting format. Only quantified concentrations of analytes shall be reported.

6.7.6. Procedures to assess the precision, accuracy and completeness of all measurement parameters. The AE shall report precision based on standards and known additions. If statistical procedures are used for data review before reporting, include descriptions.

6.8 Program Controls

6.8.1 Calibration Procedures and Frequency. List field and laboratory instrumentation, specifying manufacturers, models, accessories, etc., with procedures used for calibration and frequency of checks. The instrumentation and calibration should be consistent with the requirements of the contract and the analytical method requirements.

6.8.2 Internal Quality Control Checks. Internal quality control checks are necessary to evaluate performance reliability for each measurement parameter. The numbers and types of internal QC checks and samples proposed (e.g. blanks, duplicates, splits, "spiked" samples and reference standards, as applicable) shall be defined clearly in the work plan and summarized by methods and analytes. The laboratory's established practice for including control samples among the samples tested, and any additional controls required by the present project, shall be described.

6.8.3 Preventive Maintenance. A system for preventive maintenance for facilities and instrumentation shall be described. Preventive maintenance shall be performed by qualified personnel. Records shall be maintained and shall be available for inspection by the CO on request and subsequent repairs, adjustments and calibrations shall be recorded.

6.8.4 External Certification. Prior to any sampling activities under this SOW, the AE's analytical laboratory must be validated by the US Army Corps of Engineers, Missouri River Division (CEMRD-ED-GC, 402-221-7324) or its representative for the contaminants of concern. It is the responsibility of the AE's laboratory to achieve validation from CEMRD independent of CEHND and this delivery order. The AE should start the validation process as soon as this delivery order is awarded since the process takes approximately six (6) to eight (8) weeks.

6.8.5 Laboratory QC. Laboratory QC results shall be submitted to the QA laboratory as soon as it becomes available.

6.9 Definitions. The following terms and meanings are given as they are applied here, since usage and terminology in this field are not yet standardized.

6.9.1 Field Blank Sample is a trip blank, rinsate sample, field background soil blank sample submitted with the field samples for QC/QA purposes.

6.9.2 Field Control Samples are field splits, duplicates/replicates and Field Blank Samples submitted with the field samples for QC/QA purposes.

6.9.3 Trip or Travel Blanks are Type II Reagent Grade organic-free deionized water in 2 x 40 mL VOA vials that accompany the sample containers to the field and back to the laboratory. Trip blanks are used only for coolers

containing aqueous samples for volatile organic analysis. These blanks, as well as all other samples being submitted for volatile organic analysis, are to contain no headspace.

6.9.4 Rinsate Blanks are collected rinse water (Type II Reagent Grade) from the final rinses of the sampling equipment. Rinsate blanks are to be used in conjunction with volatile, semi-volatile and in-organic analysis of water samples. Sample preservation and containers shall be appropriate for the analytes of interest.

6.9.5 Laboratory Blank. A sample prepared at the laboratory from pure materials containing none of the analyte. Laboratory blanks include method blanks, reagent blanks and others.

6.9.6 Splits are two or more subsamples of one large sample. These are taken after compositing a large soil sample (after samples for volatile analyses have been removed). Splits are used for both QA and QC purposes for soil samples for all analytes excluding volatiles. It is acceptable to split soil samples into three portions after compositing (field sample, split for QA, and split for QC).

6.9.7 Duplicates or Triplicates are separate samples collected at the same location and time as the original sample. Duplicates or triplicates are preferred over splits for volatile organic analyses of soil samples because compositing leads to loss of volatile components. Water samples for QA/QC checking are also duplicate or triplicate samples.

6.9.8 Check/Calibration Standards are used to calibrate field instruments such as the VOA meter and are used to establish control limits for analytical parameters.

6.9.9 Quality Assurance Samples are collected by the sampling team for use by the government's QA laboratory. The purpose of the sample in to assure the government that the data generated by the AE's analytical laboratory are of suitable quality.

6.9.10 Quality Control Samples are collected by the sampling team for use by the AE's laboratory. The identity of these samples is held blind to the analysts and laboratory personnel until data are in deliverable form. The purpose of the sample is to provide site specific field originated checks that the data generated by the AE's analytical laboratory are of suitable quality.

6.9.11 Internal QC Sample or Laboratory Control. A reference standard, standard addition, replicate sample, blank or other sample are samples in which the analyte concentration is known or can be calculated, which is placed among the samples to be analyzed in order to evaluate or demonstrate validity of the analytical results.

6.9.12 Reference Standard. A sample prepared from pure reagents to contain one or more analytes at known concentrations.

6.9.13 Standard Addition or "Spiked" Sample. A field sample to which known concentrations of one or more analytes have been added.

6.9.14 Laboratory Replicate Samples. Subsamples of a single field sample which are divided at the laboratory and analyzed as separate samples.

6.9.15 Replicate Analyses. Multiple analyses performed on the same sample.

6.9.16 Laboratory Blank. A sample prepared at the laboratory from pure materials containing none of the analyte. Laboratory blanks include method blanks, reagent blanks and others.

6.9.17 Soil Blanks (Background) are used to establish background levels of metals and other analytes in soils. These are normally collected from visually clean soil near the site. The field background soil blank sample is usually counted along with the field samples. It is collected in duplicate and submitted to the AE's laboratory and the QA laboratory along with the field samples.

6.10 Site Specific Sampling and Analyses Requirements. The following specific requirements shall be addressed in the appropriate sections of the QAPP and followed in the sampling and analysis activities.

6.10.1 Groundwater Samples. Representative groundwater samples shall be collected and analyzed from the six rounds identified in the SOW. The AE shall select sampling points that will reflect the effectiveness of the trench

in treating the plume. Representative groundwater samples shall be obtained using techniques and equipment as described in the QAPP. The various procedures shall insure that samples are handled properly, equipment is clean, and sample integrity is maintained. The sampling device shall not bias sample parameter concentrations. The sample volume must be sufficient for the analyses required.

6.10.1.1 Field Control Samples, Groundwater. For each sampling period, sufficient groundwater shall be collected for three samples to form a field split. The soil shall be collected then divided among sample containers and properly preserved. Two of the three samples shall be separately identified and sent to the AE's laboratory: one as a field sample, the second as a QC sample and the third is to be sent to CEMRD for government analysis. The required number of field splits are indicated in Table 1. A rinsate sample from sampling equipment, shall also be collected. This rinsate sample shall be split, with one portion going to the AE's lab and the other going to the CEMRD lab.

6.10.2 Portable GC. The AE shall provide a portable gas chromatograph (GC) capable of monitoring the trench construction emissions. The GC shall be available for all testing operations at the trench. The AE shall describe quality control procedures, equipment utilized and operating personnel. The AE shall discuss the analytes (in relation to the site) that the GC unit will detect and detection limits. The AE will provide a qualified GC operator to run real-time tests. The sampling locations and frequencies shall be identified in the Work Plan.

6.10.3 Sample Containment, Preservation, and Holding Times. The AE shall provide information on sample containment preservation and maximum holding times for groundwater samples. When arranging the schedule for sample collection, the AE shall coordinate with the laboratory to assure that samples arrive and are analyzed within the maximum holding times specified by applicable EPA regulations and method guidelines. The AE shall be responsible for the coordination with CEMRD and for the collection and transportation of the stated number of QA samples to the government laboratory for analyses that will be conducted by the Government.

6.11 Reporting. Chemical results shall be included in the Engineering Report. Compounds identified in the samples shall be listed or tabulated, with the best estimates of concentrations that can be made from the methods and techniques employed. Concentrations reported shall be accompanied by confidence limits or other comparable indications of the associated uncertainty. The concentrations of contaminants encountered shall be compared to appropriate state or federal concentration limits for such contaminants. Data from field quality control samples and from relevant laboratory quality control samples shall also be included. The AE shall attach raw data and reports generated by field and laboratory operations to the Engineering Report as appendices.

7.0 MONITORING WELL REQUIREMENTS.

The following requirements shall be incorporated into the AE's Monitoring Well Installation Plan and followed in the field. The plan shall be prepared using the following outline as applicable:

SECTION 1.0 INTRODUCTION AND BACKGROUND
SECTION 2.0 WELL LOCATIONS AND DEPTHS
SECTION 3.0 DRILLING EQUIPMENT
SECTION 4.0 DRILLING PROCEDURES
SECTION 5.0 CONTAMINATION PREVENTION AND DECONTAMINATION PROCEDURES
SECTION 6.0 WELL DESIGN AND INSTALLATION
SECTION 7.0 WELL DEVELOPMENT
SECTION 8.0 IN-SITU PERMEABILITY
SECTION 9.0 PROJECT ASSIGNMENTS & PERSONNEL QUALIFICATIONS

7.1. Location. Monitoring well locations shall be proposed by the AE as part of the sub-plan prior to commencement of drilling activities. The AE shall obtain written approval from the facility engineer to drill at each site to avoid disturbing buried utilities.

7.2. Design of Monitoring Wells. The design and installation of all monitoring wells shall follow as closely as practical the design for properly installed, low-yield domestic water supply wells. Recommended practices for such wells are set out in "Manual of Water Well Construction Practices", U.S.

EPA Publ. EPA 570/9-75-001 (Reference 11.2). Additional design recommendations are given in "Procedures Manual for Groundwater Monitoring at Solid Waste Disposal Facilities", USEPA Publ. No. EPA 530/SW-611 (Reference 11.1). State and local certification requirements for drillers shall be met. State and local design and installation requirements shall be met. The AE shall be responsible for obtaining any soil boring or well drilling permits required by state or local authorities and for complying with state or local regulations concerning submission of well logs and samples.

7.3 Containerization of Drill Cuttings and Development Water. The AE shall contain all drill cuttings and well development water in DOT approved 55 gallon drums. The AE shall, at the end of each phase of drilling, provide documentation based upon the results of the required chemical analyses, evaluation of site conditions and knowledge of regulatory requirements, which recommend the disposition for each drum of waste. From each drum considered to contain regulated amounts of hazardous waste, the AE shall recommend a specific, optimum disposal method, along with the price for disposal. The AE shall lable and manifest, according to RCRA regulations, each drum of material which is to be handled as hazardous waste. Actual disposal will be the responsibility of the Government.

7.3. Installation of Monitoring Wells.

7.3.1 General Requirements. The AE shall provide all drilling equipment, materials and personnel required to install the wells, as well as a qualified geologist or geotechnical engineer who shall be on-site for all drilling, installation, development and testing operations. The AE shall submit proposed drilling methods in the System Design, Installation and Monitoring Sub-Plan. Any changes to the approved drilling methods must be submitted to the Contracting Officer for prior approval.

7.3.2. Protection of Water Yielding Zones. The use of any liquid, including water, is to be avoided during drilling and will only be permitted by the Contracting Officer in cases where he determines that it is absolutely necessary for successful installation of the well. If water is required during drilling or well installation, only non-chlorinated potable water will be permitted. Any proposed use and source of water must be approved by the Con-

tracting Officer beforehand. Grease or oil on drill rod joints will not be permitted. Dispersing agents (such as phosphates) or acids shall not be used. There shall be no attempt made to chemically disinfect the well. The rigs, drill tools, and associated equipment shall be cleaned with steam and washed and rinsed with a decontaminating liquid prior to commencement of drilling at each well. It is expressly required that toxic and/or contaminating substances shall not be used during any part of the drilling, well installation or well development processes. All drilling activities and methods shall be sufficient to positively prohibit the introduction of contaminants from one water bearing stratum to another via the well bore or completed well.

7.3.3 Well Design.

7.3.3.1 Boring Diameter. The boring shall be of sufficient diameter to permit at least two (2) inches of annular space between the boring wall and all sides of the centered riser and screen.

7.3.3.2 Well Riser and Screen.

7.3.3.2.1 Riser. Well riser shall consist of new threaded, flush joint, Stainless Steel pipe with a nominal diameter of two (2) inches. Well risers shall, as a minimum, conform to the requirements of ASTM D-1785 Schedule 40 pipe and shall is clearly identified as the material which is specified.

7.3.3.2.2 Screen. The well screen shall be ten (10) feet in length and shall be constructed of material similar to the well riser. The screen shall be noncontaminating, factory constructed and of "continuous wrap" or "mill-slot" design. Field slotted or cut screen is not permitted. The slot size shall be determined by the AE and designed to be compatible with aquifer and filter pack material. The AE shall provide a sieve analysis of one or more representative samples of the aquifer material in which the screen is placed and which demonstrates that the screen is compatible with the aquifer material. The sieve analysis shall be conducted in accordance with ASTM C-117 and C-136 and results shall be submitted to the Contracting Officer with the field boring logs.

7.3.3.2.3 Screen Location. The AE shall have the responsibility of placing the well screen in the appropriate location in the bore hole so that the completed monitoring well functions satisfactorily.

7.3.3.2.4 Sand-Sump. There shall be a 2-foot minimum length "sand-sump" placed below the base of the screen. The sand-sump shall be a blank section of riser conforming to the requirements of riser as described above. The sand-sump will be installed only if the screen can be placed at the appropriate interval without the sand-sump penetrating any underlying aquitards.

7.3.3.2.5 Joining Screen and Riser. Screen and riser sections shall be joined by threaded, flush-joint couplings, to form watertight unions, that retain 100% of the strength of the screen. Solvent glue shall not be used at any time in installation of the wells. The bottom of the deepest screen or casing section shall be sealed with a threaded cap or plug of inert, non-corroding material similar in composition to the screen itself.

7.3.3.2.6 Well Plumbness and Alignment. All risers and screens shall be set round, plumb, and true to line. Centralizers shall be used to assure plumbness and alignment of the wells. Centralizers shall not be installed on the well screen.

7.3.3.3 Filter Pack. The AE shall select and use clean, inert, siliceous materials to construct a uniform and continuous filter pack designed to prevent migration of fines into the screen. Carbonate or crushed stone material shall not be used. The filter pack shall be placed by tremie pipe from the bottom of the boring to approximately two (2) feet above the top of the well screen.

7.3.3.4 Bentonite Seal and Grout. A minimum two (2) foot seal, consisting of tamped bentonite pellets or bentonite slurry shall be placed into the annular space between the riser and boring wall at the top of the filter pack. Non-shrinking cement grout shall then be placed from the top of the bentonite seal to the ground surface. The cement grout shall consist of a mixture of portland cement (ASTM C-150), and water in the proportion of not

more than seven (7) gallons of clean water per bag of cement (One cubic foot or 94 pounds). Additionally, 3% by weight of bentonite powder shall be added if permitted by State regulations.

7.3.4 Soil Sampling for Geotechnical Analysis. During drilling of monitoring wells, soil samples shall be collected and geotechnical analysis shall be performed as outlined below.

7.3.4.1 Dry, hollow stem or solid auger methods of drilling shall be used wherever subsurface conditions allow.

7.3.4.2 Soil samples shall be taken continuously for the first 10 feet and at 5-foot intervals thereafter.

7.3.4.3 Sampling shall be done with a split-spoon sampler (ASTM D-1586) or thin wall sampler (ASTM D-1587) using standard sampling techniques.

7.3.4.4 Samples shall be stored in labeled, air-tight plastic or glass containers by the AE until such time as they are needed for testing or the contract is complete.

7.3.4.5 All soil samples shall be visually classified by the Unified Soil Classification System. The AE shall verify the classification by laboratory analyses consisting of the following:

	Test Description	# Required/ Well
a.	Grain-size distribution (ASTM-D 421 & 422)	2
b.	Atterburg limits (ASTM-D 423 & 424)	2
c.	Moisture content (ASTM-D 2216)	2

Specific soil samples to be tested, along with type of test, will be determined by the AE after reviewing the boring logs. Laboratory analyses shall use equipment and methods described in EM-1110-2-1906 or ASTM manuals.

7.3.5 Protection of Well. At all times during the progress of the work, precautions shall be used to prevent tampering with the well or the entrance of foreign material into it. Upon completion of the well, a suitable vented cap shall be installed to prevent material from entering the well. The well riser shall be surrounded by a larger diameter steel casing set into a

concrete pad and rising 24" to 36" above ground level. The steel casing shall be provided with lock and cap. A minimum three foot square, four inch thick concrete pad, sloped away from the well shall be constructed around the well casing at the final ground level elevation. A survey marker shall be permanently placed in each pad as detailed in Section 8.0. Four, two-inch or larger diameter steel posts shall be equally spaced around the well and embedded in the concrete pad. The ground immediately surrounding the top of the well shall be sloped away from the well. There shall be no openings in the protective casing wall below its top.

7.3.6 Temporary Capping. Any well that is to be temporarily removed from service, or left incomplete due to delay in installation, shall be capped with a watertight cap and equipped with a "vandal proof" cover satisfying applicable state or local regulations or recommendations.

7.3.7 Field Logs. The field geologist or geotechnical engineer shall maintain suitable logs detailing drilling and well installation practices. One copy of each field log including the required color slides, shall be submitted to the Contracting Officer not later than 10 calendar days after each well is completed. The well will not be accepted by the Contracting Officer until the logs are received and approved. Information provided in the logs shall include but not be limited to the following:

7.3.7.1 Reference elevation for all depth measurements.

7.3.7.2 Depth of each change of stratum.

7.3.7.3 Thickness of each stratum.

7.3.7.4 Identification of the material of which each stratum is composed according to the Unified Soil Classification System, or standard rock nomenclature, as necessary.

7.3.7.5 Depth interval from which each formation sample was taken.

7.3.7.6 Depth at which hole diameter (bit sizes) change.

7.3.7.7 Depth at which groundwater is first encountered.

7.3.7.8 Depth to the static water level and changes in static water level with well depth.

7.3.7.9 Total depth of completed well.

7.3.7.10 Depth or location of any loss of drill water circulation, loss of tools or equipment.

7.3.7.11 Location of any fractures, joints, faults, cavities or weathered zones.

7.3.7.12 Depth of any grouting or sealing.

7.3.7.13 Nominal hole diameters.

7.3.7.14 Amount of cement used for grouting or sealing.

7.3.7.15 Depth and type of well casing.

7.3.7.16 Description (to include length, location, diameter, slot sizes, material, and manufacturer) of well screen(s).

7.3.7.17 Any sealing-off of water-bearing strata.

7.3.7.18 Static water level upon completion of the well and after development.

7.3.7.19 Drilling date or dates.

7.3.7.20 Installation details of monitoring well.

7.3.8 Final Logs. The field logs shall be edited and drafted for inclusion into the final report.

7.4. Well Development. After each well has been constructed, but no sooner than 48 hours after grouting is completed, the AE shall direct a program for the development of the well by pumping and/or surging, without the use of acids, dispersing agents or explosives. Development shall continue for a period of 4 hours (minimum), and until groundwater removed from the well is clear and free of sand and drilling fluids. No water or other liquid may be introduced into the well other than formation water from that well. After final development of the well, the AE shall collect approximately 1 liter of water from the well in a clear glass jar, label and photograph it with a 35mm color slide, and submit the slide as part of the well log. The photograph shall be a suitably back-lit close up which shows the clarity of the water.

7.5. In-Situ Permeabilities. After development of monitoring wells, the AE shall calculate for each, the in-situ permeability of the screened stratum in accordance with "Methods of Determining Permeability, Transmissibility and

Drawdown," (Reference 11.3) or other equivalent methods. However, no water or other liquid may be introduced into the well other than formation water from that well.

7.6. AE Responsibility for Monitoring Wells.

7.6.1 It is the responsibility of the AE to properly plan, design, install, develop, and test monitoring wells so that they are suitable to produce groundwater samples representative in quantity and quality of subsurface conditions. The AE shall ensure that the requirements of this scope of work and best installation practices are carried out.

7.6.2 If the AE, due to his inadequate design or installation, installs monitoring wells that are not functional or not in accordance with specifications, the Contracting Officer will disapprove the well and direct the AE to repair or replace it at the Contacting Officer's discretion. This work shall be done at no additional cost to the Government.

7.6.3 If a monitoring well is disapproved by the Contracting Officer, or is abandoned by the AE for any reason, the hole shall be backfilled with neat cement grout from top to bottom by the AE at no additional cost to the Government.

8.0 SURVEY REQUIREMENTS.

8.1 Control Points. Plastic or wooden hubs shall be used for all basic control points. A minimum of three (3) concrete monuments with 3.25-inch domed brass or aluminum alloy survey markers (caps) and witness posts shall be established at the site. The concrete monuments shall be located within the project limits, be set 50 feet from the edge of any existing roads in the interior of the project limits and be a minimum of 1,000 feet apart. The placement of all monuments, hubs etc., shall be coordinated with SEAD to prevent destruction due to regular landscaping activities. Horizontal control (1:10000) and vertical control (1:5000) of third order or better shall be established for the network required for all the monuments. The caps for the new monuments shall be stamped in a consecutively numbered sequence as follows:

The dies for stamping the numbers and letters into these caps shall be of 3/16-inch in size. All coordinates are to be referenced to the State Plane Coordinate System and all elevations are to be referenced to the 1929 North American Vertical Datum.

8.2 Location Surveys. A 3.25-inch diameter domed survey marker (cap) composed of brass, bronze or aluminum alloy shall be permanently set in the concrete pad surrounding each well. Coordinates and elevations shall be established for each monitoring well and the trench. The coordinates shall be to the closest 1.0-foot and referenced to the State Plane Coordinate System. Elevations to the closest 0.01-foot shall be provided for the survey marker and for top of the casing at each well. These elevations shall be referenced to the National Geodetic Vertical Datum of 1929.

8.3 The location, identification, coordinates and elevations of all the control points recovered and/or established at the site, all of the wells, and the location of the trench, shall be plotted on a planimetric map (at a scale of 1"=50 feet) to show their location with respect to surface features within the project area. A tabulated list of the monuments and the monitoring wells, including their coordinates and elevations, a "Description Card" for each monument established or used for this project and all field books and computations shall be prepared and submitted to the Huntsville Division (CEHND), ATTN: CEHND-ED-CS. The tabulation shall consist of the designated number of the well or monument, the X- and Y-coordinates and all the required elevations. The Description Card shall show a sketch of each monument; its location with relative to reference marks, buildings, roads, towers, etc.; a written description telling how to locate the monument from a known point; the monument name or number and the adjusted coordinates and elevations. These items shall be submitted to CEHND no later than the Draft Report Submission.

9.0 SECURITY REQUIREMENTS

9.1 The following requirements must be followed by the AE at Seneca Army Depot to facilitate entry and exit of AE employees and to maintain security.

9.1.1 Personnel Registration:

9.1.1.1 A list of all AE employees, sub-contractors and suppliers indicating firm name and address will be furnished through POC/COR to the Counterintelligence Division, Building 710, 72 hours prior to commencement of work.

9.1.1.2 A confirmation of employment SDSSE-SC Form 268 will be executed by the AE concerning each employee, to include all sub-contractors and their personnel. No forms will be transferred to another file if the AE has other ongoing contracts at SEAD. The AE will provide a list of personnel who are authorized to sign Form 268 for the firm. A sample of each signature is required. Counterintelligence Division must be notified, in writing, of any changes to this list. All completed forms will be provided through COR/POC to the Counterintelligence Division 72 hours prior to commencement of work. Failure to complete Form 268 correctly will result in employee's denial of access to Seneca. The Counterintelligence Division must be notified, in writing through POC/COR to Counterintellignece, at least 72 hours prior to requesting any action. The chain of command for all AE actions will be through POC/COR to Counterintelligence Division. There will be no exceptions.

9.1.1.3 Camera permits require written notice from the POC/COR prior to access. Open camera permits will not be issued. The following information is required:

(a) Camera make, model and serial number.

(b) Contract name and name of individual responsible for the camera.

(c) Dates camera will be used.

(d) Where it will be used.

(e) What will be photographed and why.

9.1.1.4 If a rental, leased or privately owned vehicle is required in place of a company vehicle, the following information is needed.

(a) Name of individual driving.

(b) Year, make, model, color and license plate of the vehicle.

(c) Typed letter on company letterhead indicating that the company assumes responsibility for rental, leased or privately owned vehicles.

9.1.1.5 All access media will be destroyed upon expiration date of contract. If an extension is required a list of employee names and new expiration date must be furnished to the Counterintelligence Division. Contract extensions must be made prior to the contract expiration date or new Form 268s will be required for each individual that requires an extension.

9.1.2 Traffic Regulations:

9.1.2.1 Traffic Laws, State of New York, apply with emphasis on the following regulations.

9.1.2.2 Speed Limit:	Controlled Area	- as posted
	Ammo Area	- 50 mph
	Limited/Exclusion Area	- 25 mph

9.1.2.3 All of the above are subject to change with road conditions or as otherwise posted.

9.1.3 Parking: AE vehicles (trucks, rigs, etc.) will be parked in areas designated by the Director of Law Enforcement and Security. Usually parking will be permitted within close proximity to the work site. Do not park within 30 feet of a depot fence, as these are clear zones.

9.1.4 Gates:

9.1.4.1 Post 1, Main Gate - NY Highway 96, Romulus, New York is open for personnel entrance and exit 24 hours daily, 7 days a week.

9.1.4.2 Post 3, entrance to North Depot Troop Area, located at end of access road from Route 96-A is open 7 days a week for personnel and vehicle entrance and exit.

9.1.5 Security Regulations:

9.1.5.1 Prohibited Property:

9.1.5.1.1 Cameras, binoculars, weapons and intoxicating beverages will not be introduced to the installation, except by written permission of the Director/Deputy Director of Law Enforcement and Security.

9.1.5.1.2 Matches or other spark producing devices will not be introduced into the Limited/Exclusion or Ammo Area's except when the processor of such items is covered by a properly validated match or flame producing device permit.

9.1.5.1.3 All vehicles and personal parcels, lunch pails, etc. are subject to routine security inspections at any time while on depot property.

9.1.5.1.4 All building materials, equipment and machinery must be cleared by the Director of Engineering and Housing who will issue a property pass for outgoing equipment and materials.

9.1.6 AE Employee Circulation:

9.1.6.1 AE employees are cleared for entrance to the location of contract work only. Sight-seeing tours or wandering from work site is NOT AUTHORIZED.

9.1.6.2 Written notification will be provided to the Counterintelligence Division (Ext. 30202) at least 72 hours prior to overtime work or prior to working on non-operating days.

9.1.6.3 Security Police (Ext. 30448/30366) will be notified at least two hours in advance of any installation or movement of slow moving heavy equipment that may interfere with normal flow of traffic, parking or security.

9.1.7 Unions: Representatives will be referred to the Depot Industrial Labor Relations Officer (Ext. 41317).

9.1.8 Offenses: (Violations of law or regulations)

9.1.8.1 Minor: Offenses committed by AE personnel which are minor in nature will be reported by the Director of Law Enforcement and Security to the Contracting Officer who in turn will report such incidents to the AE for appropriate disciplinary action.

9.1.8.2 Major: Serious offenses committed while on the installation will be reported to the FBI. Violators may be subject to trial in Federal Court.

9.1.9 Explosive Laden Vehicles:

9.1.9.1 Vehicles such as vans, cargo trucks, etc. carrying explosives will display placards or signs stating "EXPLOSIVES".

9.1.9.2 Explosive ladened vehicles will not be passed.

9.1.9.3 When an explosive laden vehicle is approaching, pull over to the side and stop.

9.1.9.4 When catching up with an explosive laden vehicle, slow down and allow that vehicle to remain at least 100 feet ahead.

9.1.9.5 When approaching an intersection where an explosive laden vehicle is crossing - STOP - do not enter the intersection until such time as the explosive carrier has passed thru, and cleared the intersection.

9.1.9.6 When passing a vehicle that is parked, and displaying "Explosive" signs, slow down to 10 miles per hour, and take every precaution to allow more than ample clearance.

9.1.10 Clearing Post: All AE employees are required to return all identification badges, and passes on the last day of employment on the depot. The AE is responsible for the completion of all turn-ins by his employees, and informing the Counterintelligence Division and the depot organization administering the contract, for termination of any employee's access to the depot.

10.0 PUBLIC AFFAIRS

The AE shall not publicly disclose any data generated or reviewed under this contract. The AE shall refer all requests for information to SEAD. Reports and data generated under this contract shall become the property of the Department of Defense and distribution to any other source by the AE, unless authorized by the Contracting Officer, is prohibited.

11.0 REFERENCES

11.1 "Procedures Manual for Groundwater Monitoring at Solid Waste Disposal Facilities," USEPA Publ. No. EPA/530/SW-611.

11.2 "Manual of Water Well Construction Practices, " USEPA Publ. NO. EPA/570/9-75-001.

11.3 "Methods of Determining Permeability, Transmissibility, and Drawdown," U.S. Geological Survey Water Supply Paper No. 1536-1, 1963.

11.4 "U.S. Corps of Engineers Safety and Health Requirements Manual," U.S. Army Engineering Manual No. EM-385-1-1, April 1981.

11.5 "Code of Federal Regulations, "Volume 40, Parts 260 through 265 plus 270, July 1986.

11.6 "American Society for Testing and Materials, " ASTM D-421, D-422, D-423, D-424, D-2216, and D-2436.

11.7 "Code of Federal Regulation," Volume 40, Part 300, July 1987.

11.8 "Methods for Chemical Analysis of Water and Wastes," U.S. Environmental Protection Agency, Publ. No. EPA/625/6-7-003a.

11.9 "Test Methods for Evaluating Solid Wastes," USEPA Publ. No. SW- 846, July 1982.

11.10 "Guidelines Establishing Test Procedures for the Analysis of Pollutants Under the Clean Water Act," 40 CFR 136, Federal Register, Oct 26, 1984.

11.11 "RCRA Groundwater Monitoring Technical Enforcement Guidance Document" (Draft) Office of Waste Programs Enforcement, USEPA, August 1985.

11.12 "Handbook for Analytical Quality Control in Water and Wastewater Laboratories," EPA Manual 600/4-79-019, March 1979.

11.13 "Safety and Occupational Health Document Requirements for Hazardous Waste Site Remedial Actions," U.S. Army Engineering Regulation (ER) 385-1-192.

11.14 "Engineer Guidance Design Manual for Architect-Engineer," US Army Corps of Engineer. HNDM-1110-1-1. Rev. 1986.

11.15 RCRA Corrective Action Plan, OSWER Directive 9902.3, November, 1986.

11.16 U.S. Army Toxic and Hazardous Materials Agency (USATHAMA), Initial Installation Assessment of Seneca Army Depot, N.Y. Report no. AMXTH-IR-A-157, 1980.

11.17 U.S. Army Environmental Hygiene Agency (USAEHA), Final Report, Army Pollution Abatement Program Study No. D-1031-W, Landfill Leachate Study, Seneca Army Depot, 1981.

11.18 U.S. Army Toxic and Hazardous Materials Agency (USATHAMA), Update of the Initial Installation Assessment of Seneca Army Depot, N.Y. Report no. AMXTH-IR-A-157(U), 1988.

11.19 "Evaluation of Solid Waste Management Units, Seneca Army Depot", Interim Final Report, Groundwater Contamination Survey No.38-26-0868-88, U.S. Army Environmental Hygiene Agency.

11.20 "Remedial Investigations/Feasibility Studies, Seneca Army Depot Burning Pit/Landfill, Site Investigation", Draft Final Report, ICF Technology Inc., March 1989.

11.21 Draft, "Guidance For Conducting Remedial Investigations/Feasibility Studies Under CERCLA",U.S. EPA, Office of Solid Waste and Emergency Response, March 1988.

11.22 ER 1110-1-263.

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27 Sept 89

TITLE I

STATEMENT OF WORK
RCRA FACILITY ASSESSMENT
AT
SENECA ARMY DEPOT
ROMULUS, NEW YORK

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TITLE I

STATEMENT OF WORK
RCRA FACILITY ASSESSMENT
AT
SENECA ARMY DEPOT

1.0 GENERAL STATEMENT OF SERVICES

1.1 Background. As part of its continuing program of evaluating and upgrading its hazardous waste management facilities, the Army is performing hazardous waste investigations at Seneca Army Depot (SEAD), according to the requirements of the Resource Conservation and Recovery Act of 1976 (RCRA), with amendments, specifically intended to meet requirements of Section 3004(u). This work will be performed to evaluate the effects of past solid waste management practices at the facility and, to determine if remedial investigations or other actions are necessary. The US Army Corps of Engineers, Huntsville Division, is contracting for the required work on the behalf of the Seneca Army Depot.

1.2 Location. Seneca Army Depot is a US Army facility located in Seneca County, New York. SEAD occupies approximately 10,600 acres. It is bounded on the west by State Route 96A and on the east by State Route 96. The cities of Geneva and Rochester are located to the northwest (14 and 50 miles, respectively); Syracuse is 53 miles to the northeast and Ithaca is 31 miles to the south. The surrounding area is generally used for farming.

1.3 Regulatory Status. Seneca Army Depot has applied for a Part B Permit to operate a hazardous waste storage facility (SWMU designation, SEAD-1), a polychlorinated biphenyl storage facility (SEAD-2) and a deactivation furnace (SEAD-17). The demolition ground (SEAD-23) is currently under interim status. Under the RCRA hazardous and Solid Waste Amendments of 1984, Part B

Permits issued after 8 November 1984 shall require identification and corrective action at any SWMU located on the installation which is releasing hazardous constituents or hazardous wastes to the environment. This requirement applies to all SWMU's regardless of when the wastes were placed therein. SEAD was proposed for inclusion on the Federal Facilities National Priorities List on 13 July 1989. However, this consideration is based on only three areas: the abandoned incinerator (Building 2207, SEAD-15); the incinerator ash landfill (SEAD-3, 6, 8 and SEAD-14) and the OB grounds (SEAD-23). All three areas are presently being studied under other contracts.

1.4 Previous Investigations. Previous investigations have been performed at various SEAD units. The U.S. Army Environmental Hygiene Agency's Groundwater Contamination Survey No. 38-26-0868-88, "Evaluation of Solid Waste Management Units, Seneca Army Depot" (Reference 13) identifies and describes all solid waste management units (SWMU's) at SEAD. In addition, a Criteria Developement Study has been performed and closure plans are being considered for the burning pads (SEAD-23) and PA/SI studies have been performed at the Incinerator ash landfill (SEAD-3, SEAD-6, SEAD-8, SEAD-14 and SEAD-15). Consequently, these SWMU sites are not included in this Statement of Work.

1.5 Sites To be Investigated Under This Contract. The sites at which assessments are to be performed under this contract are listed in Table 1. These are sites which, as a result of the AEHA study (Reference No. 13), have been determined as having a potential for past releases and consequently, are recommended for additional soil sampling. At present, groundwater sampling is considered beyond the scope of this assessment. Recommended groundwater sampling (proposed at SEAD-4, SEAD-11 and SEAD-24) shall be conducted during follow-on RFI investigations.

TABLE 1

SITES TO BE INVESTIGATED

TASK	SWMU DESIGNATION	TITLE
3	SEAD-4	Munitions Washout Facility Leach Field
4	SEAD-16	Abandoned Deactivation Furnace
5	SEAD-17	Existing Deactivation Furnace
6	SEAD-18	Classified Document Incinerator-Bld. 709
7	SEAD-19	Classified Document Incinerator-Bld. 801
8	SEAD-24	Abandoned Powder Burning Pit
9	SEAD-25	Fire Training and Demonstration Pad
10	SEAD-26	Fire Training Pit
11	SEAD-32	Underground Waste Oil Tanks-Bld. 718
12	SEAD-33	Underground Waste Oil Tanks-Bld. 121
13	SEAD-34	Underground Waste Oil Tanks-Bld. 319
14		EOD RANGE
15		DDT BURIAL AREA NEAR THE LIFT STATION (BLDG. 2131)

2.0 OBJECTIVE

The purpose of this contract is to have the AE conduct preliminary investigation of eleven (11) Solid Waste Management Units at SEAD, to determine if hazardous wastes or hazardous waste constituents have been released to the environment from these sites, and to have the AE submit recommendations on the nature and extent of additional investigations that may be required at each site. The work shall be performed according to the requirements of the State of New York and the USEPA. All work shall be performed under the supervision of a Professional Engineer registered in the State of New York.

3.0 DETAILED DESCRIPTION OF SERVICES

The AE shall be responsible for performance of the work described in Tasks 1 through Task 15 as defined in this Statement of Work. In addition, all work shall be performed in accordance with OSWER Directive 9902, "RCRA Corrective

Action Plan", dated 14 November 1986.

3.1 Site Characterization.

3.1.1 (Task 1) Visual Inspection and Records Review. The AE shall perform a visual inspection of each site, and shall review records and reports provided by the Government or made available to the AE as published data from other sources. The purpose of this Task is to permit the AE's personnel sufficient time to become familiar with site conditions and past disposal practices before preparing the plans necessary for subsequent work at the site. It is not intended that this be a "discovery" process where new information concerning the site is sought.

3.1.2 (Task 2)-Field Investigation Plan. The AE shall provide a Field Investigation Plan which shall be compatible with this Statement of Work and with State of New York, USEPA and Army guidance documents. In general, Quality Control/Quality Assurance procedures, Standard Operating Procedures, methods, equipment, and specific personnel that the AE proposes to use for each work item shall be discussed at appropriate locations within the plan. No field work, other than the initial site inspection, shall be performed until all plans are reviewed and approved by the Contracting Officer. All work shall be performed in accordance with the approved Plans. The Field Investigation Plan shall include, as a minimum, the following sections:

3.1.2.1. Safety Program Plan (SPP). The AE shall prepare and submit a Safety Program Plan that the AE, the AE's subcontractors, and visitors to the site shall use while the field investigations are being performed. The plan shall be prepared according to the requirements of Section 5.0 of this Statement of Work, USEPA Health and Safety Plan requirements and requirements of the SEAD Health and Safety Office.

3.1.2.2 Soil Boring Plan. The AE shall prepare and submit a Soil Boring Plan according to the requirements of Section 7.0 of this Statement of Work. As a minimum, it shall propose locations of soil samples to be collected, describe the drilling equipment and decontamination procedures, and identify the responsibilities of personnel that the AE proposes to use.

3.1.2.3 Sampling and Analysis Plan. The AE shall prepare and submit a Sampling and Analysis Plan according to the requirements of Section 6.0 of this Statement of Work. The laboratory and field QC/QA plan shall be sub-

mitted as a part of the Sampling and Analysis Plan.

3.1.3 Field Investigations. The AE shall perform field investigations according to the approved Plan, in order to determine if hazardous constituents are present at the following sites:

3.1.3.1 (Task 3) Munitions Washout Facility Leach Field. The Munitions Washout Facility Leach field is designated as SEAD-4. Obsolete and defective munitions were dismantled and washed out. This treatment produced explosive solids and process water. The solids were burned at the demolition grounds while the remaining water was discharged into an area near Building 2084 and allowed to either leach into the ground or flow into a nearby ditch. Facility operation began in 1948 and continued until 1963. Presently, although the plant foundation is visible, no evidence of the leach field exists. The AE shall locate and identify the leach field from the ground surface using appropriate geophysical methods capable of penetrating a minimum depth of 20 feet. The AE shall collect and analyze 20 soil samples from the leach field and 8 soil samples from the ditch and ditch discharge areas. A total of 28 samples will be collected under this Task. Soil samples shall be taken at depths of three feet and 8 feet at ten different locations in the leach field and at 4 locations from the ditch/ditch discharge areas. Explosive compounds and heavy metals are of particular concern. Table 2 lists the types and numbers of field and QC/QA samples to be collected. See Table 3 for specific analytical methods to be used.

3.1.3.2 (Task 4) Abandoned Deactivation Furnace. The Abandoned Deactivation Furnace is designated as SEAD-16. Small arms munitions were destroyed by incineration between 1945 and the mid- 1960's. Presently, the facility is abandoned but accumulations of rainwater have been noted in the furnace area. The AE shall collect and analyze 20 soil samples from ten different locations within the immediate vicinity of the Deactivation Furnace Facility and 1 water sample from the accumulation in the furnace area. A total of 21 samples will be collected under this task. The soil samples shall be taken from depths of two and four feet. Of particular concern are explosive compounds and heavy metals (primarily lead). Table 2 lists the types and numbers of field and QC/QA samples to be collected.

3.1.3.3 (Task 5) Existing Deactivation Furnace. The Existing Deactivation Furnace is designated as SEAD-17. Small arms munitions are destroyed by incineration. Operation began in 1962. Ammunition is burned and exploded in the furnace. Residual scrap is transferred to DRMO. In addition, there exists a drainage pit with an outlet pipe which discharges into an adjacent field. The AE shall collect 10 soil samples from five different locations within the immediate vicinity of the facility and, following the location of the outlet pipe, the AE shall collect 4 soil samples from 2 different locations within the outlet drainage area. Samples shall be taken at depths of two and four feet. Of particular concern are explosive compounds and heavy metals (primarily lead). Table 2 lists the types and numbers of field and QC/QA samples to be collected.

3.1.3.4 (Task 6) Classified Document Incinerator - Building 709. Designated as SEAD-18, the incinerator in Building 709 is used to destroy classified documents. Operation began in 1956. Resultant ash is disposed off-post in a sanitary landfill. The AE shall collect and analyze 2 samples of the ash from two different locations for EP Toxicity. Table 2 lists the types and numbers of field and QC/QA samples to be collected.

3.1.3.5 (Task 7) Classified Document Incinerator - Building 801. Designated as SEAD-19, the incinerator in Building 801 is used to destroy classified documents. Operation began in 1956. Resultant ash is disposed off-post in a sanitary landfill. The AE shall collect and analyze 2 samples of the ash from two different locations for EP Toxicity. Table 2 lists the types and numbers of field and QC/QA samples to be collected.

3.1.3.6 (Task 8) Abandoned Powder Burning Pit. Designated as SEAD-24, the Abandoned Powder Burning Pit is a 4-foot high berm of approximate dimensions 150 x 325' where black powder, solid propellants and explosives-contaminated trash where burned from the 1940's to the 1950's. An adjacent shale covered area which supports an aspen stand may also have been used. The AE shall collect 20 soil samples from the pit area and 10 from the adjacent area. Samples shall be taken at a depth of 2 feet. Of particular concern are explosive compounds and heavy metals (lead and barium). A total of 30 samples from thirty different locations will be collected and analyzed under this task. Table 2 lists the types and numbers of field and QC/QA samples to be

collected.

3.1.3.7 (Task 9) Fire Training and Demonstration Pad. Designated as SEAD-25, the Fire Training and Demonstration Pad is an area of approximate dimensions of 200 yards by 50 yards that has been used since the late 1960's for fire training and more recently, for fire fighting demonstrations. The AE shall collect and analyze 50 soil samples from fifty different locations, each taken at a depth of 3 feet. Of particular concern are petroleum products and heavy metals (primarily lead from leaded fuels) since water contaminated fuels and occasionally waste oils were used for operations. Table 2 lists the types and numbers of field and QC/QA samples to be collected.

3.1.3.8 (Task 10) Fire Training Pit - Designated as SEAD-26, the Fire Training Pit is an area approximately 40 feet in diameter by approximately three feet in depth that has been used since 1977. A bentonite liner was installed in 1982 or 1983. During operation flammable materials are floated on water, ignited and extinguished. The AE shall collect and analyze 1 sample of the pit contents. Following a determination of constituents, the AE shall be responsible for the removal and proper disposal of up to 40,000 gallons of pit contents. Disposal methods shall comply with all applicable State and federal regulations. Upon completion, the AE shall collect and analyze 3 soil samples from three different locations at depths ranging from the bottom of the liner to 2.0 feet below the liner. Of particular concern are petroleum products and heavy metals (primarily lead from leaded fuels). Table 2 lists the types and numbers of field and QC/QA samples to be collected.

3.1.3.9 (Task 11) Underground Waste Oil Tanks - Building 718 - Designated as SEAD-32, two tanks exist for the storage of waste oil; the first, designated 'A', was installed in 1956 and has a capacity of 40,000 gallons; the second, designated 'B', was installed in 1978 and has a capacity of 20,000 gallons. Both are of steel construction. The AE shall TEST FOR TANK TIGHTNESS ~~collect and analyze 1 sample of each tank's contents and~~ AND COLLECT 3 soil samples from three different locations at a depth of between 1.0 and 3.0 feet below, and adjacent to, the bottom of each tank. A total of 8 samples will be analyzed under this task. Table 2 lists the types and numbers of field and QC/QA samples to be collected.

No. 6 Fuel Oil

3.1.3.10 (Task 12) Underground Waste Oil Tank - Building 121 - Designated as SEAD-33, one tank is used for the storage of waste oil. Installed in 1943, it has a capacity of 30,000 gallons and is constructed of steel. The AE shall collect and analyze 1 sample of the tanks contents and 3 soil samples from three different locations at a depth of between 1.0 and 3.0 feet below, and adjacent to, the bottom of each tank. A total of 4 samples will be collected under this task. Table 2 lists the types and numbers of field and QC/QA samples to be collected.

3.1.3.11 (Task 13) Underground Waste Oil Tanks - Building 319 - Designated as SEAD-34 two tanks are used for the storage of waste oil; the first, designated 'A', has a capacity of 30,000 gallons; the second, designated 'B', has a capacity of 20,000 gallons. Both were installed in 1951 and are constructed of steel. The AE shall collect and analyze 1 sample of each tank's contents and 3 soil samples from three different locations at a depth of between 1.0 and 3.0 feet below, and adjacent to, the bottom of each tank. A total of 8 samples will be analyzed under this task. Table 2 lists the types and numbers of field and QC/QA samples to be collected.

3.1.3.12 Containerization of Drill Cuttings. Extracted borehole material shall be contained in DOT-approved 55-gallon drums, labeled and stored at SEAD at a location approved by the Contracting Officer. Drum labels shall show the borehole identification, a description of the contents and the date the material was extracted and containerized. Upon the completion of sample chemical analysis, material considered to be non-hazardous shall be released back to the ground. Material considered to be hazardous will be identified as such and subsequent disposal shall be the responsibility of SEAD.

3.1.4 (Task 14) Preparation and Analysis of QA/QC SAmples. The AE shall collect and prepare QC/QA samples for analysis. Specific numbers and types of samples to be taken are shown in Tables 2 and 3.

3.2 (Task 15) Engineering Report. The AE shall prepare an Engineering Report which fully documents all work performed. The report shall present site description, field work performed and the results of the chemical analyses for each site, to determine if a release of hazardous waste or haz-

EOD RANGE - SHORT DESCRIPTION, SIZE OF AREA, BRIEF HISTORY OF USAGE

DDT BURIAL AREA NEAR THE LIFT STATION (BLDG. 2131) - DESCRIPTION OF AREA, SIZE, BRIEF HISTORY OF USAGE.

ardous waste constituents has occurred. The AE shall compare levels of contamination, if found, with Maximum Concentrations Limits (MCL's) or similar regulatory guidance, where existing. For each of the sites investigated, the AE shall prepare a drafted, engineering quality, line drawing which shows the sampling locations in relation to existing cultural or prominent topographical features. The report shall describe the type and severity of contamination, if found, at each site and shall make recommendations on the extent of additional investigations that may be required to fully characterize the type and extent of contamination present.